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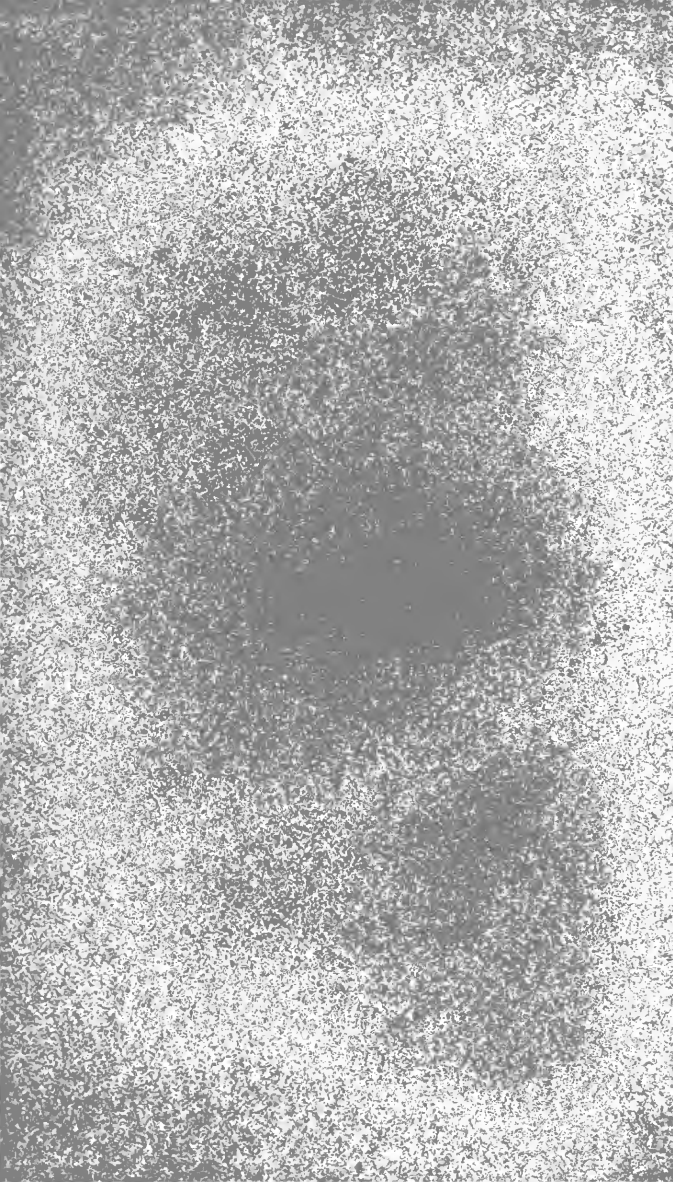
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POCKET GUIDE
TO
BRITISH
FERNS

MARIAN S. RIDLEY



A POCKET GUIDE
TO
BRITISH FERNS.

BY
MARIAN S. RIDLEY.



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A POCKET GUIDE
TO
BRITISH FERNS.

PREFATORY REMARKS.

So much has already been written concerning the Ferns of Great Britain, that it may seem presumptuous on my part to add another book on the subject.

In my own personal studies I have met with this difficulty, viz. to gather from the published volumes on Ferns what the *decided special features*, or characters are of each genus and species. For while writers mention many peculiarities in detail, some of greater and others of lesser importance, those alone which precisely mark the distinctions, whatever these may be, are either not sufficiently noted or so mingled with features of a general kind that the mind fails to grasp the essentials.

I have found, moreover, mine to be no solitary case, for many persons have expressed to me their inability to overcome, or clearly appreciate, *that something* distinguishing one Fern, or genus of Ferns, from another.

‘Tell me briefly what the peculiarities are to look for, before giving me the entire description of the Fern?’ is a question which has been often put to me.

Puzzling myself for a while, I ultimately fell upon the plan of tabulating the characters somewhat in the manner hereafter to be mentioned. I could then easily, and at a glance, carry to the mind’s eye what of necessity was to be looked for, without being encumbered with non-essential particulars, however much those might apply in a general way.

I have shown the method to several persons deeply interested in Ferns, and who, like myself, had early met with the difficulties above mentioned, and I have been advised to compile the present small pocket-guide in the hope that it might meet a want,—in spite of the many beautifully illustrated books on our native favourites.

The system, therefore, of tabulating by words without figures such of the features as alone are absolutely necessary to identify a Fern, even if never previously seen, is the sole merit of this little guide-book.

Of necessity I have been much indebted to previous writers, not altogether in following them as in their being beacons guiding towards the course and aim pursued by myself.

From what has been said, it will readily be understood that these pages are intended solely for those commencing the study of Ferns, in so far as the determination of the different species and genera is concerned ; in other words, meant

to give aid to the speedy and easy identification of the British Ferns without figures of reference.

This Pocket Guide is not put forward as a would-be rival to the many excellent books already published, but rather to lead on the uninitiated to a desire for further information.

Without meaning to be invidious, I cannot help expressing how useful I have found Mr. Thomas Moore's *British Ferns*, and *Popular History of British Ferns* (Routledge); also the *Synopsis Filicum* of the late Sir W. J. Hooker and Mr. J. Gilbert Baker (Bogue).

I take the opportunity, likewise, of mentioning that I am indebted for many kindnesses in connection with the compilation of this book, to Mr. Britten of the British Museum, to Mr. Moore of Chelsea, to Mr. Baker of Kew, to Mr. G. B. Wollaston of Chiselhurst, and to Dr. Murie and Mr. West at the Library of the Linnean Society.

I wish here to impress upon all my readers, especially those unacquainted with technical or difficult terms, the necessity of constantly referring to the explanation of each word, not allowing themselves to pass on from a single one the meaning of which they have not thoroughly mastered. To save time in searching for the explanations, I have added an Index at the end of the book which contains all the words that are the least out of the common way, by which easy reference will be found to the page on which the meaning has been given.

Mr. John Smith of Kew, in his preface to *Domestic Botany*, has so well expressed the difficulties of technical terms, that I do not

hesitate to quote his words in full ; at the same time, I have endeavoured to avoid as much as possible any expressions or words not easily or generally understood :—

‘ Many have said they would like to obtain a knowledge of the structure and classification of plants, and with that view have purchased books on that subject ; but they so abounded with technical terms and long names, difficult to pronounce, that they made no progress in the study, and therefore contented themselves with admiring their favourite plants and flowers as pretty objects. Many say they would more readily be induced to learn Botany if all plants had English names ; but when it is understood that there are 100,000 kinds of plants now known, the impossibility of giving English names to such a host must be obvious. Scientific words are consequently used, and it should be borne in mind that it is as impossible to study Botany, or any other science, without learning the meaning of the principal technical terms used, as it is to speak or read a language without a knowledge of its alphabet and grammar. By a little study, scientific terms and names of plants soon become familiar.’

GENERAL DIVISIONS OF FLOWER- LESS PLANTS.

THE vegetable kingdom is composed of everything that is a plant, from a tree to the tiny moss or fungi and common moulds meeting us everywhere. It is divided into two great sections or parts called *Phanerogamia* and *Cryptogamia*.

The former, *Phanerogamia*, is composed of all the flowering plants; the latter, *Cryptogamia*, of the so-called flowerless plants. The word *Cryptogamia* is taken from the Greek words signifying that the fruiting or fructification is concealed, as opposed to the *Phanerogamia*, where fructification is plainly manifest. Each of these great sections contains several orders. There are eleven in the *Cryptogamia*, among which is that of Ferns or Filices, the order more immediately to be treated of in these pages.

By *Order* is meant a group of separate divisions, having some principal agreeing points. Later on will be found a fuller explanation.

The eleven principal orders or classes of the section *Cryptogamia* are :—

Algæ, which includes the sea-weeds.

Fungi.—The mushroom and toad-stool family.

Lichens.—The lichens, which are chiefly little grey silvery-looking plants, growing on the bark of trees, &c.

Charæ.—Stoneworts. Water-weeds found in ponds and rivers, growing in tangled masses of a dull green colour.

Hepaticæ.—The Liverworts are plants usually of a bright green colour. Many of them have no leaves. They are found in very moist places, particularly where there is a drip, and on flat surfaces have the appearance of a green carpet. They may become a nuisance if allowed to establish themselves on the surface of the soil in flower-pots.

Musci. Mosses.—This order contains a vast number of divisions, and well repays any one who enters thoroughly into their study, for their beautifully made parts are rich in colour and elegance.

Filices.—Ferns, which is the order we are going to examine, though in these pages I refer only to the portion of it that contains our British species. (Species means the separate forms of a small division called a *genus*.)

Ophioglossaceæ.—The plants belonging to this order are sometimes placed in the order Filices; but it is questionable if they should be so placed, as they are distinguished from ferns by the different form of their spore-cases, or cover for the fruit. I shall give a full explanation of this order later on.

Equisetaceæ.—The Horsetails. They are jointed plants, sometimes branched. The stem is hollow, like a pipe, it has rather the outward appearance of a small cane, and is roughened outside with silex (flint).

Marsileaceæ.—They have been called Water-

ferns, as their mode of life rather resembles that of ferns in some respects, though they float on the surface, or creep along the bottom of water, or on mud.

Lycopodiaceæ.—The Clubmoss family is a large order, having many divisions, among which is the *Lycopodium*, which contains the species called Stag's Horn Moss, Fir Club Moss, &c., which are such universal favourites. This order is very distinct from the moss class (order *Musci*), and must not be confounded with that order.

THE DIFFERENT PARTS OF FERNS.

WE have seen that the reason why ferns belong to the section Cryptogamia, is chiefly because their organs of fructification, or propagation, are hidden, and in this respect the ferns agree with the other orders of Cryptogamia.

Why ferns have been formed into a separate order is on account of their possessing certain different parts which, so to speak, perform different functions, or, as the parts are more generally called, 'organs.'

Other Cryptogamia, or Cryptogams, perform the same necessary functions; but in ferns, the parts being somewhat more complicated, are distinguished by a separate series of names or terms. Besides, their structure is more complicated, or as vegetable physiologists say, '*differentiated*.'

In the following descriptions of the said parts, these are described from below upwards, or as the sap flows. It has also to be understood that with reference to organs these are referred to mainly as concerns their value as distinguishing features, and not as regards their functions and life-history.

Roots.—These hair-like appendages proceed from the lower part, called the Rhizome, or Cauldex; they do not differ sufficiently to form any distinguishing guide between the different kinds

of ferns, but their existence must be remembered and care taken to avoid imagining that the rhizome, or caudex, is the root, as would naturally be inferred on comparison with many of the ordinary flowering plants.

Caudex or Trunk.—A *caudex*, which is the part whence the fronds (which is the name given to the leaves of ferns) arise upwards, and from which the roots are produced downwards. The word caudex signifies a trunk; it is one of the means of distinguishing ferns, though not solely possessed by them. In certain cases this caudex, instead of being an upright body, very scaly and straight, sometimes creeps on the surface of the ground, at other times penetrates below it, and in still other cases it is only slightly scaly. It is called a rhizome when of a creeping form. It is very interesting and instructive to examine the caudex of a fern in the different divisions, just as the young fronds are beginning to come out of it. In many ferns this caudex rises up to some height above the ground when the plants are well grown; this is the case with the division or genus *Lastrea*, and more decidedly with the genus *Osmunda*. The caudex is increased in size by the remaining ends of the decaying fronds, for as they die away their base is left. In some ferns the caudex is so small as hardly to be noticed, as is the case in the genus *Gymnogramma*. In those ferns called Tree-ferns, of frequent growth in New Zealand and certain other foreign regions, the caudex attains a height of several feet, hence the term 'tree' applied to them.

The Stipes and Rachis, which together form

the stalk and branches of the frond, and, by the way, must always be gathered or cut close to the caudex. Inside the stipes there are closely packed a number of fibres, called veins, which remain altogether till the stipes reaches to where the leafy part of the frond begins. This same stipes, with its bundle of veins (fibres), now goes by the name of *Rachis*; that is, from where the leafy part of the frond begins. A bundle of these veins then branches off with each branch of the leafy part. In a branched fern this takes place as soon as the leafy part begins. This branch of the rachis which takes off its bundle of veins to each side, right and left, is called the *Secondary* rachis; and the same thing from which it separated and which continues to the top of the frond, is called the *Primary* rachis (first rachis). This primary rachis continues to send out secondary rachides (the plural of rachis), each with a bundle of veins, right and left, at intervals, and becoming smaller and smaller to the top of the frond, till the top (or apex, as it is called) is finished off, usually in a point; though in some of the British ferns the apex is of a rounded, and not of a pointed, form.

Scales.—There is one more essential point to be clearly settled, and that is with regard to the *scales*. If you notice the ferns when their young fronds are coming out of the caudex, you will plainly see that in many cases they are clothed with tiny brown things that look like small dead leaves; these are the scales, the proper name for which is *paleæ*. They protect the young, tender

buds (so to speak) of the unrolled fronds from harm. As the stipes grows and the frond is developed, the scales develop with it, and continue to be formed all along it, or, in some cases, on the lower part only. They give the stipes a very shaggy, woolly appearance, which in some kinds of ferns is continued more or less on the rachis. In other divisions of ferns, these scales do not go on developing with the stipes, but remain only near its base. In other kinds they are sparingly scattered along it; but they are, as a rule, developed precisely in the same manner in the same species, so that they form a very important feature by which to distinguish ferns. Their shape and colour are different in different species. Scales, when present, form a much more important character for distinguishing species in the Filices than in any other order of the Cryptogamia; and this chiefly on account of their greater development, which thereby furnishes more clearly-marked characters.

Vernation.—Another peculiarity of the order Filices lies in their *vernation*, that is, the way in which the young leaves (called the fronds in ferns) are rolled up before they arise from what may be termed their nest, in the caudex. In all the British species the young undeveloped fronds are rolled up inwards, towards the centre of the caudex; this peculiar form of vernation is called ‘circinate,’ that is, curled up.

The curling or rolling up of the young fern-fronds is one of their chief distinguishing marks; they all have this peculiar form of vernation, while the only other Cryptogams which have it

are some of the Marsileaceæ. The only other plants that have this circinate vernation are a foreign order called Cycadaceæ, and the British genus *Drosera*, or Sundew. Both these belong to the Phanerogamia, so that with these three exceptions this peculiarity of vernation is not possessed by any other members of the vegetable kingdom.

The Frond and Venation.—The next peculiarity of the order Filices for consideration is the *frond* and its different parts. The first of these parts is the *stipes*, which is the ‘stalk,’ so to speak, but is always spoken of as the stipes. This stipes is the beginning of the visible venation, which really begins in the caudex, and is carried up through each stipes to each frond. By *venation* (not to be confounded with vernation) is meant the arrangement of the veins in a frond. By *veins* is meant here, fibres, that look like lines on the leaves. The arrangement, or the way in which these fibres are placed, is a very important point by which to distinguish ferns. We must trace this venation from the base of the stipes where it has been broken from the caudex.

Take any good large frond (the larger the better, but it must be freshly gathered) to experiment on. For this purpose some of the species of the genus *Lastrea** or *Polystichum*† will be the best, or if these are not to be had, any fern with a divided frond will do.

Branches or Pinnæ.—The branches or *pinnæ*, as they are called, would appear to have nothing to do with the primary rachis further than being

* See table, page 57. † See table, page 49.

in some way fastened to it ; but if you gently tear a pinna (that is one of the pinnæ), you will see that the secondary rachis, and in like manner all its veins, form a part of the primary rachis, and can be traced down clearly, in most instances ; but even if indistinct, the venation nevertheless is present in all down to the base of the stipes, as I mentioned above.

➤ If you hold a pinna up to the light, or better still, examine it with a magnifying glass, or pocket lens, you will see that the secondary rachis has little branches, or what are termed *veins*. When these veins branch they are called *venules*, and when the venules branch again (as in some ferns is the case) the branches of the venules are called *veinlets*. Now it is on some part of these veins, but in the same division of ferns always on the *same* part, that the fruit-organs are borne, as we shall see hereafter ; this particular part of the vein, the venule, or the veinlet, which is always rather thickened, is called the *receptacle*, and on this receptacle the fruit-organs are placed.

There is a genus of ferns called *Scolopendrium*, which has one species a native of our land ; this is commonly called the Hart's-tongue Fern, from the shape of the frond being somewhat like the tongue of that animal ; it is named by botanists *Scolopendrium vulgare*, because of its frequency. I allude particularly to it here because it is one of the British ferns that bears what are called simple fronds, namely, those without branches going off, and consequently it does not have a secondary rachis, and the continua-

tion of the stipes, instead of going by the name of rachis, is in this fern called the *midvein* or *costa*. The branches of the midvein are called veins, in the same way as the branches of the secondary rachis of divided or pinnate ferns are so named, as stated above; in like manner the branches of the veins are called venules. In the case of a pinnate fern that is pinnatifid, as is the usual state of *Lastrea cristata*, there are two midveins, the first called the *primary* midvein, which takes the place of the secondary rachis, and proceeds from the rachis; and the *secondary* midvein, which proceeds from the primary midvein into the leafy portion that takes the place of pinnules, viz. the smaller divisions of the pinnæ.

I have not given the above somewhat full explanation of venation because it is peculiar to ferns alone in the vegetable kingdom; for though none of the other Cryptogams have it in such a complete form, yet in the Phanerogamia it is the rule rather than the exception.

Ferns have one very great peculiarity or characteristic connected with their venation, namely, the *receptacle*, which is a thickening of some part of the vein, venule, or veinlet, on which the fructification is borne, as was explained above.

In the explanation of the different ferns will be given descriptions of the distinctive venation of each, and of the position of the receptacle on the venation.

Organs of Fructification.—We come now to the most important differing points of the order Filices, namely, the organs of *fructification*,

which, in their peculiarities, divide ferns from the whole of the rest of the vegetable kingdom. The organs of fructification in the ferns are in most instances seated at the back of the fronds, but in some genera they are situated close to or beyond the margin; in *Osmunda*, their position is totally different to that of those of the other ferns, as will be hereafter explained. We have stated that, at some given place of the venation, either the vein, venule, or veinlet, is thickened. Upon this thickening, which is the *receptacle*, the so-called *thecæ*, or spore-cases, are formed; they also bear the name of *sporangia*. This beginning of the fructification does not appear till the frond is developing. Spore is the name given to the seed of ferns. Each bundle of thecæ (spore-cases) is called a *sorus*. By bundle, I mean each separate mass or cluster of thecæ that is singly placed on the receptacle. When two or more such bundles are spoken of, they are called *sori*, the plural of *sorus*. The *sori* are called *dorsal* when they are situated on the under side of the frond, and *marginal* when they are placed at the edge of the frond or project beyond it. The thecæ (spore-cases) are composed of brown cells of thin texture, and are usually of a roundish shape, but vary in different divisions. It will not be necessary in this work to go further into their microscopic structure. About two dozen thecæ are found in one bundle, that is, in each distinct sorus which is placed separately as a dot-like patch, for instance, in the genera *Polypodium*, *Polystichum*, &c.; but this number varies greatly.

The greater number of the genera of British Ferns have their thecæ connected with the receptacle by a short band which passes round them in the form of a small elastic ring called an *annulus*; it is jointed, and usually rather darker in colour than the spore-case. This elastic ring splits asunder when the spores within the case are ripe.

The way in which the spore-case splits must be carefully examined with a magnifying glass. In all but three genera this splitting or opening takes place about half-way down the spore-case, beginning with the bursting of the ring, and continuing more than half-way across the spore-case towards its opposite side. This elastic ring, which surrounds the spore-case (as it always does more or less completely), is termed *vertical* in contradistinction to *oblique* or *horizontal*, which is the position of the annulus of the spore-case in the two British genera, *Hymenophyllum* and *Trichomanes*.

In these two genera where the ring is horizontal (broadwise so to speak) instead of vertical, the splitting asunder to let out the ripe spores takes place from the apex of the spore-case down its centre, instead of across it, as in the other genera. One might be inclined at first to think that this splitting asunder regularly is really of casual occurrence, varying in different ferns; but the long experience of our most eminent botanists has proved that these peculiarities are most constant. It is therefore one of the best means for grouping or arranging ferns.

Reference has already been made to the

genus called *Osmunda*, which has organs of fructification different from those of any other. So different is this genus in many other respects, that some authors have thought fit to place it, together with a foreign genus called *Todea*, which agrees with it in several points, into a sub-order called Osmundaceæ.

Polypodiaceæ is composed of those ferns which have thecæ that split transversely. There are two exceptions, namely, the genera *Hymenophyllum* and *Trichomanes*, whose thecæ split vertically (from the top) ; but they have not generally been thought to differ sufficiently in other respects to merit their being placed in a different sub-order. The ring in *Trichomanes* and *Hymenophyllum*, as we have previously seen, has a horizontal position (that is, placed broad-wise) ; it does not surround the thecæ lengthways, but forms a band round their breadth. It is very minute, as the spore-cases are particularly small in these two genera, and therefore requires magnifying power to be clearly seen.

Though this ring is exceedingly minute and difficult of detection, nevertheless it is necessary to know of its existence ; for its presence surrounding the spore-case is the chief point wherein these two genera agree with the sub-order Polypodiaceæ.

Spores are minute bodies contained in the spore-cases ; they have to the eye the appearance of fine powder, but, magnified under the microscope, they exhibit many very curious and well-defined shapes, in most instances showing such regularity of outline, figures, and markings,

as to enable species or genera to be identified by them.

The spores of ferns, in a certain sense, resemble the seeds of flowering plants, inasmuch as new plants spring from them ; but they more specially resemble the bulbils of ordinary plants, which, as everyone knows, produce perfect plants without the necessity of fertilisation by pollen grains. In ferns, there is a peculiar development or intermediate form before the complete plant is reached. The first thing that is produced from the spore is a leaf-like expansion called a *prothallium* ; this bears certain bodies called *antheridia* and *archegonia*, that perform the same functions that stamens and pistils do in the Phanerogamia.

The Indusium or Involucre.— Besides the receptacle, the spore-case, and the spores, there is another important organ for distinguishing genera by its presence or absence, shape, &c., and also, in a few instances, for distinguishing species by its character, and that is the so-called *Indusium*, a sort of covering which is placed over the young thecæ. If a frond of, for example, *Lastrea Filix-mas*, is noticed in the spring, soon after it has developed, there will be seen on its under-surface pale-coloured patches instead of brown spore-cases. These are the indusia (plural of indusium), thin membranes which are really the continuations of the outer skin of the frond. Their shape varies in different genera, but is perfectly constant in character in each genus. As the young thecæ arrive at maturity (ripeness), the indusium gradually is lifted up ;

sometimes it dies away quickly, but in other cases remains attached for some time after elevation. The special character of the indusium will be recorded under each notice of the genera and species. It is advisable for ascertaining the characters of the indusium thoroughly to examine the frond in various stages; that is, first, when the indusium is forming, secondly, when it is formed, and, thirdly, when it begins to die away. In some instances this cover is not placed *over* the thecæ only, but is seated *beneath* them, and partially or entirely covering them as well, in which case it is called the *Involucre* instead of the *Indusium*.

TERMS APPLICABLE TO THE SHAPES, &c., OF FRONDS.

FOR understanding the description of the shape (or outline) of fronds, we must first consider what are the forms they assume.

Lanceolate is the most common shape ; it means that the frond gets smaller gradually at the apex and base of the leafy portions.

Acuminate denotes that the frond tapers gradually to a point at the end.

Linear means narrow ; that is, when the length is considerably longer than the breadth.

Triangular is of the shape of a triangle, resembling the Greek letter delta (Δ), for which reason it is often called *deltoid*.

Cordate is in the form of a heart.

Ovate refers to the shape of an egg, broader at its base than at the point (much the same as *oval*).

Obovate is the same form as *ovate*, but with the broadest part above the middle.

Oblong is much longer than broad, but broader than is implied by the term *linear*.

Elongate is lengthened out, remarkable for its length.

Flabelliform is fan-shaped.

When two adjectives formed from words having different meanings are used together, the form to be understood is one between the two ;

for example, by *ovate-lanceolate* is understood that the outside is not so much the shape of an egg as ovate would be, nor quite so tapering to each end as lanceolate would be.

Elongate-triangular means a form resembling a triangle, but more lengthened out.

Linear-lanceolate is narrower than lanceolate, but more tapering to each end than linear would be, though broader altogether than linear.

Another important point to be learnt is the separate name that is given for each division or branch of the frond. We have previously seen that the Hart's tongue fern—*Scolopendrium vulgare*—contains fronds that are called entire, that is, without any divisions or branches. Now when a frond is divided or notched on each side of the rachis, such notches not being so deeply cut as to reach the rachis, the frond is then called *pinnatifid*; this is the case with *Polypodium vulgare*.

When the notches or divisions of a frond are so deeply cut that the cutting reaches as far as the rachis, the frond is then called *pinnate* (or once divided).

The *Asplenium Trichomanes* is an example of this, its notches or cuttings being like tiny leaves on each side of the rachis. These little divided cuttings are the pinnæ.

These descriptions will be used in the explanation of each fern, so that it is very essential they should be thoroughly understood previously.

As mentioned when speaking of venation, the secondary rachis branches off right and left in

divided or pinnate ferns. Now in some kinds of ferns this secondary rachis is very strongly marked. The leafy divisions of the pinnæ, which are borne on the secondary rachis, are called *pinnules*, when the notching of the pinnæ is cut down to the secondary rachis. *Lastrea æmula* and *Lastrea rigida* are examples of this kind of dividing, which constitutes a *bipinnate* frond.

If the leafy division of the pinna is not cut down to the secondary rachis, but is merely scalloped out, the pinnæ are called *pinnatifid*; the word pinnules not being applied to it, unless it is cut so deeply that the cutting reaches the secondary rachis, or is only joined to it by a portion of the venation which has the appearance of a minute stalk. *Lastrea Thelypteris* is an example of the above-mentioned division, and the correct description of its fronds is therefore 'Pinnate, pinnæ pinnatifid;' but the description of *Lastrea æmula*, on the contrary, ought to be 'Fronds bipinnate,' which implies that its pinnæ are again divided into pinnules, the leafy portion of the secondary rachis being cut down to the said rachis, so that none of the leafy portion actually touches it.

In some ferns the entire leafy portion is more than once pinnatifid, as in *Trichomanes radicans*, where it is tripinnatifid, or even quadripinnatifid or quadrifid (cut into four lobes or segments.)

All these points are great helps for distinguishing species.

Lobes are the divisions of the pinnatifid frond; the term *segment* is usually used to

denote a smaller part than a lobe. In *Lastrea dilatata*, which is one of our most divided (or compound) ferns when the frond is of luxuriant growth, the pinnules are pinnatifid, and so deeply so, as to be almost, and sometimes even quite, divided to the third rachis. This third rachis is formed by the principal vein of the pinnule, when there are distinct divisions of the pinnules. The frond then becomes *tripinnate* instead of bipinnate, and the divisions of the pinnules are called *pinnulets*; but this state of things varies with different fronds, and is chiefly confined to the lower pinnæ. *Pteris aquilina* becomes tripinnate in the same way. In its ordinary growth it is bipinnate, with its pinnules deeply pinnatifid.

In studying these explanations, it must be borne in mind that the true divisions which are stated to prevail in any fern cannot be found all over the frond, as with nearly all of them the upper part or termination, both of the frond and of the pinnæ, is elongated or lengthened out; so what is to be understood as characteristic is taken from the parts that are the largest and most conspicuous.

The margins of the lobes or segments are usually not entire, but notched slightly into what are called *teeth*.

If these teeth or divisions of the margin are regular and pointed like a saw, they are called *serratures*, or more commonly the margin is said to be *serrated*.

If the margin is cut into rounded teeth, it is called *crenate*, and the teeth are termed *crenatures*.

When the teeth are stiff, hard, and sharp-pointed, they are spoken of as *spines*, and the frond called *spinous*.

When the teeth are finer and more hair-like, they are called *bristles*.

GROUPING OF FERNS.

I HAVE before mentioned, in speaking of the divisions of plants generally, that there is, first, the order ; secondly, the sub-order ; thirdly, the genus ; and lastly, the species. Altogether there are forty-two species of British Ferns,—I am referring of course to those found wild in England, Scotland, Wales, Ireland, and the Channel Islands.

By Sub-order is understood a division wherein the structural characters belonging to it are less universally applicable than in the Order, but at the same time more prevalent than in what constitutes a genus. Sub-orders have been arranged so as to contain genera agreeing in their principal points, as a help for determining their several marked differences. Thus we have seen that the order is Filices (ferns) ; there are only two sub-orders among the British Ferns,—that is to say, none of the other sub-orders (three in number) of the whole of the ferns have genera containing British species.

The sub-order *Polypodiaceæ* contains all the British genera except one,—the genus *Osmunda*, which, as we have seen, is placed in the other sub-order, *Osmundaceæ*.

There is sometimes another grouping of ferns, namely, into *tribes*, which division comes between

the sub-order and the genus ; but I cannot help thinking that this subdivision, instead of promoting a knowledge of ferns, is more frequently only a hindrance, particularly to beginners, who find every name hard.

A Genus is applicable to a group of plants which possess a certain community in the details of their structure, such structural conditions belonging to few or many of what are regarded as species. Genera is the plural of genus.

Species may be regarded as an assemblage of individual plants resembling each other in their general characters and able to propagate directly or indirectly individual plants which retain within certain definite limits the type of the parent plant.

A Variety differs from a species in the trivial nature and inconstancy of its peculiarities, these being very apt to revert to the original parent form. The cultivated varieties of our British Ferns have great interest in the eyes of some amateurs, but our remarks are confined to the ordinary wild forms.

Among those who have made ferns a study, there is so much difference of opinion with regard to naming and classifying them, that it is difficult to say which method is the best. It really matters little which is chosen, so that one system is pursued consistently.

GENERA OF BRITISH FERNS.

I HAVE adopted in this work the plan generally in use of arranging the genera, not alphabetically, but according to their relations or points of resemblance with one another, beginning with *Polypodium*.

The seventeen genera which include all the British species belong to two sub-orders, the Polypodiaceæ, which comprises sixteen genera distinguished by the presence of a complete annulus (which is usually vertical, see page 16), and the Osmundaceæ containing the *Osmunda* with an incomplete annulus seated on one valve only of the spore-case, and the sori usually in terminal clusters and not on the back of the frond.

POLYPODIACEÆ.

1. *Polypodium* ; this word is taken from the Greek, and means 'many-footed,' in allusion to the branching of the rhizome. It contains five species.

2. *Allosorus* ; this signifies 'different,' and 'a heap,' and probably has reference to the apparent fact of the sori being heaped up differently in various stages of their development. It contains one species.

3. *Gymnogramma*, from Greek words meaning 'naked' and a 'line,' referring to the ab-

sence of indusium to the thecæ, which are arranged in lines, and not circularly, as in the *Polypodium* genus.

4. *Polystichum*, from the Greek 'poly,' 'stichos' ('many,' 'row'), on account of the many regular lines in which the sori are placed. It contains three species.

5. *Lastrea*; named after Delastre, an eminent French botanist. It contains eight species.

6. *Athyrium*; from a Greek word meaning 'opened,' alluding to the turned back position into which the indusium is forced by the ripe thecæ. It contains one species.

7. *Asplenium*; so named in reference to its supposed medical qualities. Nine is the number of species in this genus which is the largest of the seventeen genera.

8. *Scolopendrium* is derived from the word 'Scolopendra,' signifying a genus of animals known as 'centipedes,' which are found most numerous in the tropical parts of the world. The sori are supposed to resemble the legs of the centipede. There is only one species.

9. *Ceterach*. This is a very old name, supposed to be taken from the word 'chetherak,' given to this plant by Oriental medical writers. It contains one species.

10. *Blechnum*, from a Greek word signifying 'a fern.' It has one species.

11. *Pteris*; named from the feathery character of the fronds. It contains one species.

12. *Adiantum*, from a Greek word meaning 'dry,' from the fact that the fronds strongly resist water. It has one species.

13. *Cystopteris* ; in allusion to the peculiar indusium, which is bladder-like. It contains three species.

14. *Woodsia*, after a well-known English botanist called J. Woods. There are two species in this genus.

15. *Trichomanes*, from Greek words meaning 'hair' and 'excess,' alluding to the character of the receptacle which stands out beyond the thecæ like a bristle. It has one species.

16. *Hymenophyllum* ; so called in reference to the thin texture of the fronds. It contains two species.

OSMUNDACEÆ.

17. *Osmunda* ; named, probably, from an old local tradition, according to which a man named Osmund hid his wife and child among the tall fronds of this fern to save them from the cruel Danes, who were ravaging the place. It contains one species only.

Osmunda is placed in the sub-order Osmundaceæ, as we have previously learnt. The reason that it is kept apart from the sub-order Polypodiaceæ is that its sori are not placed either at the back or at the margin of the frond, as in the genera in that sub-order, but in clusters distinct from its leafy portion ; also on account of the spore-case opening vertically and into two valves, and because the ring of the spore-case is an incomplete one and is seated on one valve only of the spore-case. The vernation is circinate, as in Polypodiaceæ.

THE ADDER'S TONGUE GROUP, OPHIOGLOSSACEÆ.

LET us now proceed to examine the other order of the section Cryptogamia, which has been previously noticed, under the head of Ophioglossaceæ, at page 6.

This order contains only two genera that are British,—*Ophioglossum* and *Botrychium*. *Ophioglossum* contains two species, *Botrychium* but one. *Ophioglossum* is derived from Greek words, that mean 'a serpent' and a 'tongue,' a translation of the English name given to the species of this genus, namely, 'Adder's Tongue,' from their supposed likeness to a serpent's or adder's tongue. *Botrychium* is derived from a Greek word, *botrys*, 'a cluster,' in allusion to the masses of sori on the fertile portion of the plant, which are in clusters somewhat in the form of a bunch of grapes.

The chief point of agreement in this order Ophioglossaceæ, distinguishing them from Filices, is their vernation being straight, not circinate: that is, the fronds before they are developed are not rolled up, but are folded flatly together. Their sori are formed on a spike, which is in reality a branch of the leaf, or the continuation of the leaf-stalk.

The chief distinguishing points between this order and that of the ferns, Filices, are the entire absence of any ring to the spore-case, which is two-valved, and formed on the upper portion of the branch of a leaf, not on the back of the leaf. In Ophioglossaceæ the two-valved spore-case opens transversely, and the species in both genera bear only one leaf to a plant, or two at the most. The part that forms the *caudex* or *rhizome* in Filices is quite different in this order, being somewhat bulb-like at its base, swollen, and juicy ; it is called the stem.

SUMMARY AS TO PLAN OF THE TABLES.

THE series of tables which I have given below, where each species is treated of separately, is according to the following plan :—

1. First, there is the *scientific title* (of Latin or Greek origin), with the abridged or full name of the botanist who *first* gave this name, and after that the common name by which the fern is ordinarily known.

2. In each instance the special points of the genus are next given under the heading of *generic characters*.

3. Under *distinctive specific characters* are noted the special peculiarities, and the points of difference from which the fern is known from all others of the genus to which it belongs.

4. Whether the fern has a *rhizome* or *caudex*.

5. The characters of the *stipes* and *rachis*.

6. The scales of the *stipes*.

7. The *shape of the frond*, its average *size* the length and width being ascertained. With regard to the latter, the widest part only is recorded, and the measurements given must be taken to mean inches, unless it is specially notified that it is feet ; thus 2-3 long 1-2 wide means that the height of the frond, including the stipes, is from 2 to 3 inches long, and

from 1 to 2 inches wide (that is in the widest part) and all other particulars of the frond besides are given.

8. The *texture* of the frond, some ferns being hard and leathery, others very soft, thin, and transparent. Some have both their surfaces smooth—that is without hairs—some have them on the under side only: these hairs also vary in different species, being sometimes hard, when they are more properly called *spines*, and in others more like down, when they are called *pubescence*. *Glands* are also present in some of the species on the surface of the fronds and at their margins; they are minute wart-like swellings, or tiny tumours, sometimes having stalks, sometimes being stalk-less; when they are present the frond is spoken of as glandular.

9. Whether *deciduous* or *not*; the former referring to the fern's shedding its fronds in the autumn, the latter that the fronds last through the winter or longer.

10. *Venation*, the full character of it. The expression found in the generic characters of *Lastrea*, *Veins free*, means that in this genus the veinlets do not unite. It is the chief character distinguishing it from the foreign genus *Nephrodium* from which modern pteridologists (persons possessing a knowledge of ferns) have separated it; in that genus the lower veinlets usually unite. This joining together of the veinlets, or of any portion of the veins, is called anastomosing, or the veins are said to anastomose. The network *holes* which this uniting together forms, are called *areoles*. The network is

sometimes called the *reticulation*, or the veins are spoken of as being *reticulated*—that is, resembling network.

11. Position of the *receptacle*.

12. *Sori*, shape of and usual quantity ; also whether they become *confluent* (that is, uniting together to form a mass), or whether they keep to their original shape.

13. Whether the sori are *dorsal* or *marginal*.

14. If there is an *indusium* or *involucre*, or neither ; when present, shape and character of such.

15. *Locality* or *where found*.

16. Lastly come the *General Remarks* to each species.

The tables themselves, instead of following here, will be found towards the end of the present little volume, and they are numbered consecutively.

CONCLUDING OBSERVATIONS.

As this book is in reality intended for amateurs, I venture to add a few remarks upon the plan to be followed in collecting and mounting, and upon the use of the pocket magnifying-glass, &c.

As to Forming an Herbarium.—A capital plan has been lately started by the editor of the monthly journal called *Science Gossip*, which affords great help for obtaining the accurate

names of ferns, &c. In its pages are given the names and addresses of qualified persons who are willing to act, without any charge whatever, as Assisting Naturalists. Under their names are given the special branches of natural history in which they undertake to give help, by naming the specimens sent to them. Again, supposing you wish to have a larger collection of ferns than you have the opportunity of collecting yourselves, you will find it a good plan to advertise or answer advertisements in that useful newspaper called *The Exchange and Mart*, which has among its numerous advertisers some experienced botanists who, at a reasonable rate, supply good and accurately-named fronds or complete collections. By whatever means obtained, it is, however, advisable that a small collection should be got together.

The printed labels, with the names of all the British species, and the abbreviated name of the botanist after each who first gave it such name, thus *Polypodium vulgare*, L., are bound with the present work for cutting out and placing on the collector's specimens.

Mounting Ferns.—The ferns should be mounted on loose sheets for ready reference; or if a book is preferred, the kind made for newspaper cuttings is the most suitable, as it allows space to the fronds without causing difficulty in closing it, as is the case with ordinary bound leaves.

The specimens should be fastened on the sheets by means of narrow slips of gummed paper. Care should be taken that none of the leafy portion is caught in when fastening the

frond down. It is not advisable to gum down the whole frond; but if wished to do so, use powdered Tragacanth gum moistened with water, as this does not leave disfiguring shining marks.

Arrange each species on a page by itself; if two fronds of each are not possessed, then place the one so as to show the under side with its thecæ. Be particular, when gathering fronds, to select one of each species with thecæ.

Most of the ferns have their thecæ on some of the fronds only, though all the fronds are usually alike in general appearance; the fertile (those that bear thecæ) are, however, generally narrower in outline.

Pocket Lens.—The magnifying glass is an essential for acquiring a knowledge of ferns.

A small pocket lens, with two or three glasses commonly called a *triplet*, can be obtained at any of the opticians from 2s. 6d. to 5s., according to quality. In my own case, I have found the lens called a '*Coddington*' to be the most useful, affording pleasure by its clear defining power. The Coddington lens is, however, more expensive, ranging in price from 10s. to 14s.

With regard to its use if out-of-doors, face the sun, holding the specimen steadily in your left hand, the magnifying glass in the right. Each person must judge for herself or himself how best to bring the rays of light upon the specimen while avoiding the glare, and also at what distance to place the lens towards the eye. Generally speaking, with the common hand lens, from about an inch to two inches between glass

and object, and the same between the eye and the glass, is necessary. With the Coddington, both eye and object must be placed much nearer it, and in most instances quite close to it.

It is advisable not to shut the left eye in looking through the right, as the contraction of the lids and the knitting of the eyebrows tend rapidly to weary the observer.

If this cannot be managed at first, begin with one eye, letting the other open gradually. If the lens is used in a room, stand near the window, and follow the above directions, which, if carefully carried out, will remove the difficulties so many persons experience in looking through a magnifying glass.

What is a common fault, and therefore ought specially to be avoided, is the looking through a glass with one's back to the light; or, again, stooping the head over the specimen in such a way as to obscure the rays of light. One great point is the throwing a flood of light on the object to be examined; and another to use the lens according to fancy, but in such a way as to give least strain to the eyes.

The Compound Microscope I need only allude to by name; for, although a most necessary instrument in the study of the minute structure of ferns, it is not necessary in the ordinary determination of species.

Tabular Descriptions versus Drawings.—I have purposely refrained from introducing in this work any drawings, because it is of such importance to consult the real fronds. Plates are a great

help when it is impossible to procure the ferns themselves ; but they never do and never will, however beautifully and accurately printed, answer the same purpose.

It may be useful, again, to notice, as has already been incidentally remarked in the matter of labelling, that there is placed after the Latin titles of ferns, as of other plants, the name in full, or, more often, a contraction of the name of the botanist who first gave this title.

The great Swedish botanist, Linnæus, has the distinction of being quoted by *L.*, though *Linn.* is very often used. This is sufficient to serve as an example ; explanation of other contractions will be found at pages 90 and 91.

Examination of Specimens.—Supposing a beginner has been in the country and found some ferns, and naturally desires to ascertain their names, how ought he or she to set about finding out this from the accompanying tables?

1. Begin by examining the under surface of the fronds, in order to ascertain if the fern is in fruit ; in other words, is the plant in fructification or does it possess sori ? If not in fruit, then occasionally the beginner will find a difficulty ; for example, the Lady Fern and the Alpine Polypody in nearly all respects resemble each other, excepting in the form of their sori and the presence of an indusium in the former case. *In only a few instances* does it make no difference whether the plant be in fruit or not.

Thus, then, it is necessary on all occasions to obtain specimens in fruit, for leaves of certain other plants may be inadvertently mistaken by the inexperienced for those of ferns, but cannot be so if sori are present.

2. Note the forms of the sori. Supposing they are linear (or in lines), then the fern does not belong to either of the following genera, namely, *Polypodium*, *Allosorus*, *Woodsia*, *Cystopteris*, *Polystichum*, *Lastrea*, *Athyrium*, *Trichomanes*, *Hymenophyllum*, or *Osmunda*. This reduces the number of genera to be compared to six.

3. Look at each of the characters of the genera that are not included in the above mentioned, namely, *Gymnogramma*, *Blechnum*, *Pteris*, *Adiantum*, *Asplenium*, *Scolopendrium*, and *Ceterach*, and endeavour to find out which of them corresponds or agrees with the principal features in the frond under examination. Take, for instance, the Common Spleenwort (*Asplenium Trichomanes*); on turning to page 86 for the Key of the Genera, it will be seen that in its *generic characters* the sori are stated to be linear, and singly placed on the side of the venation, and that the indusium is of the same linear form, both the indusium and sori being straight, not curved. These characters give the clue as to which genus (namely, *Asplenium*) this fern belongs.

4. But supposing the sori not to be of linear form on the fern under consideration, then it is to be referred to the other group of genera first mentioned, namely, that commencing with *Polypodium*. Space forbids my dwelling here on the particulars of each genus; the reader should

study the different characters of the several genera by careful reference to the Key and Tables.

5. Having found the genus, it is next wanted to make out the species. To find the species, it is necessary again to compare with the other species of the said genus, and separate the fern from all its fellow species, as was done in searching for the genus to which it belongs. The chief points in which species differ are in the characters of their stipes and rachis, the form and colour of the scales, the shape, cutting, and hue of the fronds, and in their venation.

In the Common Spleenwort (*Asplenium Trichomanes*), the question at issue is, in what respects it differs from the other eight species of the genus. On examination, the specimen is found to have a dark brown stipes and rachis, also pinnate fronds, but not a bipinnate frond, wherein it differs from the Black Maiden-hair Spleenwort (*A. Adiantum-nigrum*). The Green Spleenwort (*A. viride*) has a green stipes and rachis and pinnate fronds, the former distinguishing it from the Common Spleenwort, and the latter from the Black Maiden-hair Spleenwort, which has bipinnate fronds. The Sea Spleenwort (*A. marinum*) is marked by its leathery texture and deep green colour of the fronds, while possessing other characters of the foregoing. So on each of the other five species of the genus is to be successively compared with the specimen under examination, *A. Trichomanes*. Above all, to make progress, strenuously endeavour to master the peculiarities of but one genus or one species at a time.

ORDER: **Filices.**

SUB-ORDER: **Polypodiaceæ.**

(True Ferns.)

1. **POLYPODIUM VULGARE, L.** Common Polypody.

Sori round. No indusium.

Thick rhizome; pinnatifid fronds. Not deciduous.

Rhizome thick and branching, covered when young with brown scales.

Green, but yellow when dried; the mid-vein takes the place of the rachis.

None.

Usually lanceolate. Pinnatifid, slightly serrated. 6-18 long, 3-6 broad.

Rather leathery.

Not deciduous, but fronds are sometimes killed by sharp frost.

A mid-vein from which veins branch at intervals on each side of it; these veins first throw off one venule, then go on and branch off into two, three, or four veinlets, each ending in a thick point near the margin of the pinnatifid division.

On the apex of the first branching of the vein (venule), and ending in the middle of the pinnatifid division.

Round.

Dorsal; situated at intervals in two rows along the pinnatifid division.

None.

Universally distributed.

It is easily recognised by the thick rhizome and bright yellow round sori. Its favourite abode is the stump of an old tree.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex

Stipes and Rachis .

Scales of ditto . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found . . .

General Remarks .

2. **POLYPODIUM PHEGopteris**, L. Beech Fern.Generic Characters.
Distinctive Specific
Characters.

Sori round. No indusium.

Crowded pinnatifid divisions, deeply cut into lobes; the tapering point of the apex of the frond; the lowest pair (sometimes the two lower pairs of divisions) being pinnate, and the lowest pair of pinnae being always bent downwards.

Rhizome or Caudex

Rhizome very creeping, slender, dark-coloured, rather scaly.

Stipes and Rachis .

Stipes long; pale green, dark brown at the base; rachis also pale green.

Scales of ditto . .

Few, buff-coloured, pointed, at the base of the stipes, and very small; also on the rachis, and continued along it nearly to the apex of the frond, and also on a portion of the mid-vein.

Frond

Ovate-triangular, tapering to a long point. 6-20 long, 3-6 in widest part. Pinnatifid, except the lowest pair of divisions, or sometimes the two lowest pairs, which are not joined to the rachis by the leafy portion, and are therefore pinnae. All the pinnatifid divisions and the pinnae are deeply lobed.

Texture of Frond .

Thin; very hairy on the under side.

Deciduous or not .

Deciduous.

Venation

A stout mid-vein branches off from the rachis into each of the pinnae or the pinnatifid divisions; from it runs into each of the deeply-cut portions (called lobes) a wavy vein (that is not straight, but undulating); from this branch off, at intervals on each side, the venules, those farthest from the apex of the lobe bearing the sori; the venules occasionally branch into veinlets.

Receptacle

On the apex of the venule, close to the margin of the lobe.

Shape of Sori . . .

Round, about ten to a lobe, but varying and usually becoming confluent.

Dorsal or Marginal.

Almost marginal.

Indusium

None.

Where found

More common in Scotland and Wales; rare in Ireland.

General Remarks .

Its favourite abode is a shady bank near a continual drip, though not confined to it.

3. POLYPODIUM DRYOPTERIS, L. Oak Fern.

Sori round. No indusium.

The division of the frond into three distinct branches; each branch being rolled up separately in vernation; the smooth thin texture of the frond; the bending downwards of the rachis, which is therefore here called deflexed; and the bright cheerful green of the fronds.

Rhizome dark-coloured, very spreading, and slender.

Very long, slender, straw-coloured; but rachis and base of stipes darker.

A few, pale brown, lanceolate in shape; only present at base of stipes.

Deltoid (triangular); bright green. 4-12 long, 4-8 in widest part. It is divided into three distinct portions or branches. The two side branches, which are the lowest pinnae, resemble the upper portion or apex, but their apices point sideways; pinnate, or rather partially bipinnate, as the lowest pair of the divisions of each of the two branches are divided by a tiny stalk from the secondary rachis, and are therefore pinnules. In large fronds, the two lower pairs (that is, those farthest from the apex of the pinnae) of the said divisions are divided into pinnules, the two lower portions of the upper branch are the other pinnae, but they are much smaller than the lower pair. The frond is more or less crenate.

Very thin, almost transparent. Not hairy.

Deciduous.

The secondary rachis branches off into each of the two large side portions (the lower pinnae) for some way before the leafy portion of the frond begins, it then sends a mid-vein into each pinnule and pinnatifid division; into each lobe of the pinnule and pinnatifid division a wavy vein branches from this mid-vein, which bears venules in moderate-sized fronds, but in larger fronds, veinlets also. In the upper portion of the frond, the leafy part comes close to where the secondary rachis branches.

On the apex of the venule, or (when veinlets are present) on each side of the veinlet which is nearest the vein.

Round. The number of them in a lobe varies, usually it is eight; they generally become confluent.

Almost marginal.

None.

Rather common in Scotland and Wales, more so than in England; rare in Ireland.

When the young fronds are beginning to show from the rhizome, they are of a paler colour than is the case with those of *P. Phegopteris*.

Generic Characters.
Distinctive Specific Characters.

Rhizome or Caudex
Stipes and Rachis .
Scales of ditto . .
Frond

Texture of Frond .
Deciduous or not .
Venation

Receptacle

Sori
Dorsal or Marginal .
Indusium
Where found
General Remarks .

4. **POLYPODIUM ROBERTIANUM**, Hoffm. Limestone Polypody.

Sori round. No indusium.

The separate rolling up of the pinnae in vernation, in addition to that of the three branches; the lowest pinnae not forming two such complete apex-like portions as in *P. Dryopteris*; the glandular pubescence of its stipes, rachides, and frond.

Rhizome, very creeping, thicker than in *P. Dryopteris*.

Very long, rather stout, pale green. Minutely glandular, as are also the rachides.

A few at the base, of pale brown colour, much pointed.

Somewhat triangular, but lowest pinnae much the largest, and the apex elongated. Pinnate; in strong fronds partially bipinnate, for then the lowest pinnae have pinnules (a few); the rest of the frond is pinnatifid, the lobes of the pinnatifid divisions are crenate, particularly the lower portions. Darker green than *P. Dryopteris*. 5-13 long, 3-7 in widest part.

Thin, but not so thin as in *P. Dryopteris*. Glandular, mostly on the under side; a mealy appearance being thus given to the whole frond.

Deciduous.

The secondary rachis branches off some way before coming to the leafy portion, as in *P. Dryopteris*; it then sends out a mid-vein into each pinnule and pinnatifid division of the pinnae, from which branches a wavy vein into each lobe of the pinnule and pinnatifid division; this vein sends out venules, which generally have two veinlets extending to the margin.

On the apex of the venule; when there are veinlets, it is placed on the one nearest the vein, on each side of it, as in *P. Dryopteris*.

Round, about eight in a lobe, varying according to the size of it; they often become confluent.

Almost marginal.

None.

In the limestone districts of England and Wales. Abundant in the Lake Country.

The glandular pubescence, noticed above, is composed of minute stalked wart-like swellings of a pale colour, giving a mealy appearance to the frond, rachides, and stipes. A lens is necessary to see them, and the frond should be held flat for examination, not upright as usually is best. This fern much resembles *P. Dryopteris*, so great care is required to master its specific characters.

Generic Characters .
Distinctive Specific
Characters.

Rhizome or Caudex
Stipes and Rachis .
Scales of ditto . .
Frond

Texture of Frond .
Deciduous or not .
Venation

Receptacle

Sori
Dorsal or Marginal .
Indusium
Where found
General Remarks .

5. POLYPODIUM ALPESTRE, Hoppe. Alpine Polypody.

Generic Characters .	Sori round. No indusium.
Distinctive Specific Characters.	The lanceolate outline of its fronds. Pinnules much pinnatifid; the presence of the caudex instead of a rhizome.
Rhizome or Caudex	Caudex; which is usually divided into several crowns.
Stipes and Rachis .	Short, green, as is the primary rachis also.
Scales of ditto . .	Few, rather broad, ending in a point, pale brown in colour.
Frond	Lanceolate. Usually 12-18 long, and in widest part 7 broad; bipinnate, pinnules pinnatifid.
Texture of Frond .	Thin.
Deciduous or not .	Deciduous.
Venation	The secondary rachis throws off a mid-vein into each pinnule; this mid-vein sends out a vein into each of the pinnatifid divisions of the pinnule, and from it branch out alternately on each side of this vein two or sometimes three venules (according to the size of the frond); they extend almost to the margin of each of the lobes of the pinnatifid division.
Receptacle	On those venules of each pinnatifid division that are nearest the mid-vein on both sides of it at about the middle of the venules, and on their surface.
Sori	Round; about six on each pinnule; they sometimes become confluent.
Dorsal or Marginal.	Dorsal.
Indusium	None.
Where found . . .	Only in the Highlands of Scotland usually with the <i>Lady Fern</i> .
General Remarks .	This fern greatly resembles <i>Athyrium Filix-femina</i> in almost every respect, except in the roundness of the sori and absence of an indusium; there is sometimes, however, a very slight coating which appears to come from the receptacle and looks rather like a real indusium over the sori, but it is not a true one.

6. ALLOSORUS CRISPUS, Bernh. Parsley Fern.

The fronds being of two kinds, barren and fertile. The nearly round sori being concealed by the margin of the frond turned over them.
Only one species.

A rhizome.

As long as the leafy portion, or longer, pale green (straw-coloured when dry), slender and smooth, the mid-vein is the rachis.

None usually, but sometimes a few small ones at the base.

Of two kinds, barren and fertile. Tri- or quadripinnatifid, though they appear to be bipinnate, &c., particularly the fertile frond, but in using the lens it is seen that there is no real cessation of the leafy portion, which begins from the upper part of the stipes. Triangular or triangular-ovate. 4-12 long, 2-4 wide (the fertile one); the barren one 3-10 long and 1½-3 wide, paler green in colour, the segments are broad and leaf-like; the fertile one is contracted by the rolling over of the margin to cover the sori, and is more pinnatifid than the barren one, and the segments are narrow and pod-like.

Soft, but not very thin, smooth.

Deciduous.

Each final lobe of the fertile frond has a wavy mid-vein which produces veins and venules. Owing to the much pinnatifid character of the fronds, the venation is puzzling, but the above explanation is sufficient.

On the surface of the venules near their apex, which apex is very pointed.

Nearly round; about ten to a lobe on each side of the mid-vein of the lobe; they become confluent when mature, uniting to form two lines around the mid-vein.

Dorsal.

No true indusium, but the margin of the frond is rolled over, and is pale in colour; it completely covers the sori till they are ripe or mature, when it is raised up by their pressure.

Generally among loose stones or on stone or slate walls. Very abundant in the Lake District, also plentiful in Wales. Rarer in Scotland and Ireland.

Called by some botanists *Cryptogramme crispa*. The barren frond much resembles the common parsley in appearance, hence its name.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex .

Stipes and Rachis .

Scalcs of ditto . .

Fronds

Texture of Fronds .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found . . .

General Remarks .

7. GYMNOGRAMMA LEPTOPHYLLA, Desv. Slender Gymnogram.

Generic Characters.	The linear forked sori without an indusium.
Distinctive Specific Characters.	Only one British species.
Rhizome or Caudex	A caudex which is very small.
Stipes and Rachis.	Of a dark brown colour in mature fronds, which colour is continued in a portion of the primary rachis.
Scales of ditto . . .	None.
Frond	Of three kinds. The earliest are $\frac{1}{2}$ in. high, fan-shaped, and pinnatifid; the next produced fronds are 1-2 in., pinnate, with pinnæ pinnatifid and fan-shaped; the fertile fronds are 3-8, bipinnate or tripinnate, and ovate. All are from 1 to 1 $\frac{1}{4}$ in. wide.
Texture of Frond .	Thin.
Deciduous or not .	Deciduous; of yearly existence only. See General Remarks.
Venation	The secondary rachis goes off on each side of the primary rachis, sending a vein into every pinnule; it branches twice so as to send a venule into each division of the pinnule, the venules usually becoming forked, and one veinlet proceeds nearly to the apex of each of the divisions into which the pinnules are cut.
Receptacle	On the whole length of the veinlet, also on a portion of the venule; it is situated on their surface.
Sori	Linear, forked; becoming confluent when mature.
Dorsal or Marginal.	Dorsal.
Indusium	None.
Where found . . .	In Jersey only, and usually on moist banks.
General Remarks .	This is the only British fern that is of yearly or annual existence. It begins to grow from its germinating spore in the autumn, arriving at maturity the next summer, when it soon dies away, scattering its spores for producing new plants.

8. **POLYSTICHUM LONCHITIS**, *Roth.* Holly Fern.

Sori round, with round indusium; the indusium being attached in its centre to the receptacle by a tiny stalk; leathery texture of the fronds.

Being pinnate, and of very rigid texture.

A thick caudex.

Short, thick, and dark-coloured; the rachis is also stout.

Numerous; usually lanceolate in shape, pale brown. A few are present also on the rachis.

Linear-lanceolate; pinnate; pinnae serrated with prickly teeth called spines. 6-10 long, 1-2 wide. Dark green in colour.

Resembling holly in being rigid and leathery, and in having prickly spines and a glossy surface.

Not deciduous.

It is not very clearly visible, but is as follows:—A mid-vein leaves the rachis, going into each pinna; from it a vein goes into the ear-shaped lobe, and from it branches a venule, which is again branched into veinlets; the mid-vein then continues its course to the apex of the pinna, and sends out veins branching into venules, which generally branch into veinlets, one venule or veinlet terminating at each tooth or spine of the frond.

On the venules or veinlets nearest the mid-vein, also on the branchings from the vein in the ear-shaped lobe; always on their surface, not at their side.

Round; about fifteen to each pinna. When mature they become confluent. All the sori are confined to the upper part of the frond.

Dorsal.

Round, dark brown in colour; it does not fall away for some time, but shrivels up in the centre of the sorus; it opens by lifting itself up all round at its margin.

In Scotland, near Loch Earn, on Ben Lomond, and other mountains. Also in North Wales and in Ireland. Rare in England.

This is not common anywhere in the United Kingdom, nor does it ever attain to the luxuriant growth of specimens found in Norway, and seldom is it so fine as the Swiss plants.

Generic Characters

Distinctive Specific Characters.

Rhizome or Caudex

Stipes and Rachis .

Scales of ditto . . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found . . .

General Remarks .

9. **POLYSTICHUM ACULEATUM**, *Roth.* Common Prickly Shield Fern.

Sori round, with round indusium; the indusium being attached in its centre to the receptacle by a diminutive stalk. Leathery texture of the fronds.

It agrees with *P. Lonchitis* in having sharp spines and a rigid texture, but differs from it in being bipinnate. The pinnules are not so distinctly stalked as in *P. angulare*. The fact of the indusium dying away early is a marked distinction.

A caudex which is stout.

Short, stout, and thickly covered with scales; a few of these are on the primary rachis.

Numerous; rust-coloured, thin, and pointed at the apex, but broad, ovate-lanceolate in other parts.

Lanceolate (broadly lanceolate in large fronds); bipinnate. 1-2 ft. and more long, 5-10 in. wide.

The margin of the pinnules serrated with spines or teeth called '*aculei*,' hence its name. Dark green in colour. The upper pinnules nearest the primary rachis are much larger than the rest, with an ear-shaped lobe on the side that is farthest from the primary rachis. Rigid, leathery, and glossy.

Not deciduous.

That of a pinnule is as follows:—A mid-vein goes from the secondary rachis into each pinnule, from it branch veins which divide into venules; this is the venation of an ordinary-sized frond. In very large fronds, more veins and venules are present; there are also more venules in the ear-shaped lobe.

On the several venules that are nearest the mid-vein, both on the upper and lower sides of the pinna; it is situated about half-way down the venule, which extends beyond it nearly to the margin.

Round; from ten to eighteen on a pinnule. They are situated at the upper half of the frond only, as a rule. In large mature fronds the sori become confluent. There are also several sori in the ear-shaped lobes.

Dorsal.

Round; it is attached in the middle by a diminutive stalk to the receptacle. As the frond becomes mature, it usually curls up and falls away, leaving the sori without its coverings, and so it is important to examine the fronds early. Universally distributed.

There is a fern much resembling this, which is the variety *lobatum* of this species; it differs chiefly in being narrower and not divided into pinnules, except the lowest pair of divisions, and then only near the rachis.

Generic Characters . . .

Distinctive Specific Characters . . .

Rhizome or Caudex . . .

Stipes and Rachis . . .

Scales of ditto . . .

Frond

Texture of Frond . . .

Deciduous or not . . .

Venation

Receptacle

Sori

Dorsal or Marginal . . .

Indusium

Where found

General Remarks . . .

10. POLYSTICHUM ANGULARE, Presl. The Soft Prickly Shield Fern.

Sori round, with round indusium; the indusium being attached in its centre to the receptacle by a diminutive stalk. Leathery texture of the fronds.

The pinnules forming a very obtuse angle with the secondary rachis, that is, the inner edge of the pinnule is more widely separated from the secondary rachis than in *P. aculeatum*; the softer texture of the fronds with soft teeth or hair-like bristles. The pinnules are more distinctly stalked; the whole frond is more densely scaly than in the other two species. The indusium remains after the sori are ripe.

A caudex which is thick.

Stout, rather longer than in the other species; very thickly clothed with scales, as is the primary rachis; and in strong fronds the secondary rachis is also much clothed.

Of a yellowish red tint, narrow lanceolate in shape, but much lengthened out at the apex; mixed with these are numerous hair-like scales. Both are found on the primary rachis, they diminish in size towards the summit.

Lanceolate; bipinnate. 2-4 ft. long, 6-11 in. wide. The upper pinnule of each pinna is usually larger than the others, but rarely as large as in *P. aculeatum*; the pinnules are more decidedly stalked, and arise at a more obtuse angle from the secondary rachis than in *P. aculeatum* (which probably is the reason of its name), but they have much the same ear-shaped lobe. Thinner and softer than in the other species, and not glossy. A few hair-like scales are usually scattered over the pinnules.

Not deciduous.

A wavy mid-vein goes into each pinnule; from it branch about three pairs of veins, which bear venules extending to the margin (except those that bear the receptacles, which terminate with them or nearly so). There are a greater number of venules in the ear-shaped lobe. On those venules that are nearest the mid-vein.

Round, about fourteen to a pinnule, forming a line on each side of the mid-vein, sometimes becoming confluent when mature; sori are also present in the ear-shaped lobe. Dorsal.

Round; it is attached in its centre. When the sori are becoming mature, it curls up round its edges, but remains attached to the receptacle till after the sori have burst.

Rather rarely in Scotland. In other parts of the United Kingdom common on hedge-banks.

This fern and its fellow species are called *shield* ferns, from the supposed likeness of their indusium to the shape of a shield. *P. angulare* has developed into a vast number of varieties, many of which keep tolerably constant to their deviation from the normal type.

Generic Characters.

Distinctive Specific Characters.

Rhizome or Caudex Stipes and Rachis.

Scales of ditto . . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found

General Remarks .

11. *LASTREA THELYPTERIS*, Bory. Marsh Buckler Fern.

The kidney-shaped indusium, which assumes that shape by having the notch at its base by which it is attached to the receptacle; the thin texture of the fronds, which are mostly deciduous. These characters distinguish this genus from that of *Polystichum*. Veins free.

The presence of a rhizome and absence of a caudex; the long stipes, which is almost if not quite destitute of scales; the stipes and rachis being slender; the indusium of not quite such a marked kidney shape, and the veinlets of all the venules bearing each a sorus. There being no scales on the stipes or rachis.

Rhizome; slender and very creeping.

Slender, as long as, or longer, than the leafy portion in the fertile fronds, but shorter and slighter in the barren ones; it is dark-coloured near the base, the rest and the rachis are yellowish green, straw-coloured when dry.

None.

Lanceolate, but very slightly narrowed at the base. Pinnate; pinnae deeply pinnatifid. 1-2 ft. long, 4-6 in. wide. Bright green in colour. The fertile fronds are the tallest, and their pinnatifid lobes are narrowed by the margin being revolute or rolled backwards.

Thin; smooth.

Deciduous.

A very prominent somewhat wavy vein goes into each pinnatifid lobe from the mid-vein, and sends out venules and veinlets which extend to the margin.

On both the veinlets of each venule, near their base, where they branch into venules.

Somewhat round; about twenty-two to each lobe of the pinnae. They often become confluent.

Almost marginal.

Roundish; not so decidedly kidney-shaped as is usual in the genus. Small, whitish, torn, and furnished with glands at the margin, it is soon pushed open by the sorus, and dies away early. In all the species of this genus, the indusium opens by lifting up all round its margin.

On bogs or very moist places. Rather rare. Found in several places in England, North and South Wales, and in Ireland, but very uncommon in Scotland.

This species much resembles *L. Oreopteris*; but besides its specific characters, the darker green of the fronds at once distinguishes it from the yellowish green of those of *L. Oreopteris*.

Generic Characters.

Distinctive Specific Characters.

Rhizome or Caudex

Stipes and Rachis .

Scales of ditto . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal.

Indusium

Where found . . .

General Remarks .

12. **LASTREA OREOPTERIS**, *Bory.* Lemon-scented Fern.

The kidney-shaped indusium, which assumes that shape by having the notch at its base by which it is attached to the receptacle; the thin texture of the fronds, which are mostly deciduous. These characters distinguish this genus from that of *Polystichum*. Veins free.

The stalkless glands on the fronds, which give out a strong scent of lemons; the tapering at both ends of the fronds, which is particularly noticeable towards the basal extremity; and the yellowish-green colour of the fronds.

Caudex rather thick; not upright, but somewhat drooping.

Short, thick, glandular, as is also the rachis.

Ovate-lanceolate in shape; numerous on the stipes, a few on the rachis (but these more resemble hairs); all are very pale in colour, almost white.

Lanceolate, but much tapering at both ends. Pinnate; pinnæ deeply pinnatifid. 1-3 ft. long, 4-8 in. wide. Usually yellowish green; thickly clothed with small glands without stalks, which give out a strong smell resembling that of lemons, particularly when the fronds are bruised.

Thin; clothed on the under side with stalkless glands.

Deciduous.

A wavy vein goes from the mid-vein into each lobe of the pinnæ; from it branch venules, and sometimes veinlets in the larger lobes.

On those venules or veinlets nearest to the vein, close to the apex of it; in all the species of *Lastrea*, it is situated on the surface of the vein or its branchings, not on their sides.

Somewhat round, but soon becoming confluent; about fifteen sori to a lobe.

Almost marginal.

It is not always present in this species, but when existing, it is kidney-shaped. It is smaller than the sorus, jagged at its edges, and dies away early.

Very abundantly in Scotland, where it attains a great height near streams in mountainous districts. Much less common in England, Wales, and Ireland.

This fern is often called *montana* by botanists. It somewhat resembles *L. Filix-mas*, but its specific characters are very distinct, and the bruising of a frond, which produces an odour like lemon, enables the youngest beginner easily to distinguish it.

Generic Characters.**Distinctive Specific Characters.****Rhizome or Caudex****Stipes and Rachis.****Scales of ditto.****Frond.****Texture of Frond.****Deciduous or not.****Venation.****Receptacle.****Sori.****Dorsal or Marginal.****Indusium.****Where found.****General Remarks.**

13. LASTREA FILIX-MAS, Presl. Male Fern.

The kidney-shaped indusium, which assumes that shape by having the notch at its base by which it is attached to the receptacle; the thin texture of the fronds, which are mostly deciduous. These characters distinguish this genus from that of *Polystichum*. Veins free.

Being partially bipinnate, as well as broadly lanceolate in outline.

A caudex large.

About one-third the entire length of the frond densely clothed with scales; green in colour, as in the rachis, but the colour, particularly in the stipes, is hidden by the scales.

A quantity on the stipes, large, narrow lanceolate in shape, pale brown; there are also smaller ones mixed with them. On the primary rachis there are scales also of the same colour, but narrower and more pointed.

Broadly lanceolate, partially bipinnate, the pinnæ not being always thoroughly divided into pinnules, but decidedly cut or pinnatifid; usually only the lower pinnæ have pinnules. All are serrated; the pinnæ are narrow elongated. 1-2 ft. long, 6-12 in. wide. Rather dark green in colour.

Rather thin; smooth.

Not regularly deciduous, though the fronds are usually killed by the frost; in very sheltered places they remain on till the young ones appear in the spring.

A wavy mid-vein goes from the primary rachis into each pinnule or pinnatifid division; from it branch veins and venules, which extend nearly to the margin.

On about the middle of those venules that are nearest the mid-vein.

Almost round. 4-8 or more on a pinnule or pinnatifid division, but becoming confluent. The indusium remains on the mass, in patches.

Dorsal.

Kidney-shaped, margin entire, greyish in colour. It does not die away early.

It is very common, and universally distributed.

This species is by a noted botanist, Mr. Wollaston, divided into three; but I have not here adopted his plan, not thinking it necessary for this work. A number of tolerably constant and beautiful varieties have developed from this species.

Generic Characters .	
Distinctive Specific Characters.	
Rhizome or Caudex	
Stipes and Rachis .	
Scales of ditto . .	
Frond	
Texture of Frond .	
Deciduous or not .	
Venation	
Receptacle	
Sori	
Dorsal or Marginal .	
Indusium	
Where found . . .	
General Remarks .	

14. **LASTREA REMOTA**, Moore. Remote Buckler Fern.

The kidney-shaped indusium, which assumes that shape by having the notch at its base by which it is attached to the receptacle; the thin texture of the fronds, which are mostly deciduous. These characters distinguish this genus from that of *Polystichum*. Veins free.

The oblong lanceolate outline; the pinnules being somewhat triangular in shape, and those of the lower pinnæ being at some distance apart; the great variety in the outline and marking of the scales.

A caudex.

About a fourth part of the length of the frond, stout, as is also the primary rachis; both are pale green in colour.

Numerous and various. Some are broad ovate, pale brown, acute; others lanceolate, with a dark blotch at the base; others small, pointed, and distinctly dark centred; others ovate, and pointed.

Oblong lanceolate; bipinnate, with pinnæ deeply pinnatifid, so as to be almost divided into pinnules; these lobes are serrated and toothed at the tips with spines. 2-3 ft. long, about 6 in. in width.

Thin; smooth.

Deciduous.

A wavy mid-vein goes from the secondary rachis into each pinnule, and sends out veins which terminate in the spines beyond the margin.

On the apex of the veins nearest the mid-vein, on both sides of it.

Nearly round; large, about six on a pinnule; they are present on almost the whole frond.

Dorsal.

Kidney-shaped, pale brown in colour; its margin is entire, and without glands. It soon shrivels up, but remains attached until the frond has withered.

Only at Windermere in Westmoreland; a few plants were once found there, and none have since been discovered. It is found abroad, and was first made known in Germany.

This very rare species resembles *L. Filix-mas* in general structure, but in texture and appearance the variety *spinulosa* of *L. cristata* is the fern which it is most like.

Generic Characters.**Distinctive Specific Characters.****Rhizome or Caudex****Stipes and Rachis .****Scales of dlto . .****Frond****Texture of Frond .****Deciduous or not .****Venation****Receptacle****Sori****Dorsal or Marginal.****Indusium****Where found . . .****General Remarks .**

15. **LASTREA RIGIDA**, Presl. Rigid Buckler Fern.

The kidney-shaped indusium, which assumes that shape by having the notch at its base by which it is attached to the receptacle; the thin texture of the fronds, which are mostly deciduous. These characters distinguish this genus from that of *Polystichum*. Veins free.

The reddish-brown colour of the scales, and their being so much broader at the base of the stipes; the narrow elongate-triangular outline of the fronds; their being bipinnate without spinulose serratures.

A caudex which is somewhat thick.

Rather stout, particularly at the base, one-third or more the length of the frond; green, and densely covered with scales. Rachides green.

Numerous; long and pointed, but very broad near the base; in colour reddish brown. On the primary rachis they are hair-like. On both the rachides there are many short-stalked transparent glands.

Narrow; elongate-triangular. Bipinnate; pinnules pinnatifid; the lobes are serrated, the teeth soft and hair-like. 12-18 long, 4-6 wide. Colour rather dull green.

Somewhat thin; the upper surface, when young, is sprinkled with small stalkless glands, which give out a faint odour, hardly noticeable when dry. Deciduous.

A mid-vein that bends in and out, goes from the secondary rachis into each pinnule, from it branch veins and venules; the venules end in the serrated lobes.

On the middle of the venules that are nearest the mid-vein, on each side of it.

Almost round; rather large; about six to ten on a pinnule. They often become confluent.

Dorsal.

Kidney-shaped; lead coloured; sometimes pale brown when old. Its margin is fringed with small stalked glands; on its surface also there are glands. It does not die away early.

In the limestone districts of Westmoreland, Lancashire, and Yorkshire.

The specific name *rigida*, would appear to have been given to this species from its manner of growth which is rather rigid in appearance. It most resembles *L. Filix-mas*, but the glands on the rachides (which in every case must be looked for with a lens) easily distinguish it.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex
Stipes and Rachis .

Scales of ditto . . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found . . .

General Remarks .

16. LASTREA CRISTATA, Presl. Narrow Prickly Buckler Fern.

The kidney-shaped indusium, which assumes that shape by having the notch at its base by which it is attached to the receptacle; the thin texture of the fronds, which are mostly deciduous. These characters distinguish this genus from that of *Polystichum*. Veins free.

The very straight, upright growth of the fronds; the broad pinnatifid lobes of the pinnae, and the stout rachis; its decided preference for boggy situations.

A caudex, rather stout.

It is one-third or more the length of the frond, very stout and shining; dark brown below, green above, or sometimes the brown colour is continued. The rachis is as stout as the stipes, and yellowish green in colour.

Few, broad, ovate, and very thin, pale brown in colour; some are occasionally on the rachis.

Narrow, linear-oblong, tapering at the apex, but hardly narrowed at the base. Not quite bipinnate, but pinnate with the pinnae, having deep broad lobes, the margins of which are serrated and tipped with spines. The fronds grow in a very upright manner. 12-8 long, 3-5 wide. Rather dark green in colour.

Somewhat thin; smooth.

Deciduous.

That of a pinnatifid portion (taking the place of a pinnule) is as follows:--A wavy secondary mid-vein, distinct from the primary mid-vein, sends out veins and venules, which latter end in rather thickened points in the spines beyond the margin of the frond.

On about the middle of the venules, nearest to the secondary mid-vein.

Nearly round. They are almost always confined to the upper portion of the frond, about eight on each pinnatifid portion that takes the place of a pinnule. They do not often become confluent.

Dorsal.

Kidney-shaped, its margin entire, very pale brown in colour; it does not die away early, but remains usually till the sorus has burst.

Almost entirely confined to boggy situations in Norfolk, Suffolk, Cheshire, and Nottinghamshire.

It is doubtful why this species was named *cristata*, and we are inclined to think the writing must have been misinterpreted, as the name is quite inappropriate. One of its varieties, *spinulosa*, is common, and it is bipinnate.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex Stipes and Rachis .

Scales of ditto . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found . . .

General Remarks .

17. *LASTREA DILATATA*, Presl. Broad Buckler Fern.

The kidney-shaped indusium, which assumes that shape by having the notch at its base by which it is attached to the receptacle; the thin texture of the fronds, which are mostly deciduous.

These characters distinguish this genus from that of *Polystichum*. Veins free.

The dark colour of the centre of the scales; the ovate-lanceolate outline of the fronds; the very dark brown colour towards the base of the stipes, and partially on the primary rachis.

A caudex which is stout.

From a third to half the length of the frond; rather stout, particularly near the lower part; green, except near the base, where very dark brown. On strong fronds the brown colour is continued up the back of the stipes, and partially on the primary rachis, which is otherwise green.

A quantity, near the base, not so many above; lanceolate, but much tapering to each end, more particularly at the apex; colour pale brown, except the centre, which is very dark brown. On the primary rachis there are a few scales, which are usually of the same two shades of brown, but these are much smaller and narrower.

Ovate-lanceolate, as a rule, but it varies, being occasionally triangular. Bipinnate or partially tripinnate, the pinnules are so deeply pinnatifid as to be almost converted into pinnulets; all the margins are sharply toothed, ending in bristle-like points. 1-4 ft. long, 7 in. to 1 ft. wide. The fronds grow in a drooping manner. Pale green, when quite young; a much darker shade when mature.

Rather stout, usually smooth, but sometimes glandular when young, more usually on the upper side. Only partially deciduous, as the fronds do not always die away in autumn.

A distinct mid-vein goes from the secondary rachis into each pinnule, from which veins branch, one into each lobe of the pinnules; venules and veinlets develop from it, and terminate in thickened points near the margin, in the direction of each bristle-like point.

On about the middle of those venules that are nearest the mid-vein.

Almost round; about six to each pinnatifid lobe. They are on the whole of the back of the frond, as in *L. æmula*. They do not often become confluent.

Dorsal.

Kidney-shaped, of a very pale buff colour; the margin has stalked glands. It does not die away early.

Universally distributed.

This species somewhat resembles *L. æmula*.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex Stipes and Rachis .

Scales of ditto . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found .

General Remarks .

18. *LASTREA EMULA*, Brack. Hay-scented Fern.

The kidney-shaped indusium, which assumes that shape by having the notch at its base by which it is attached to the receptacle; the thin texture of the fronds, which are mostly deciduous. These characters distinguish this genus from that of *Polystichum*. Veins free.

The crisped appearance of the whole frond; the scales being narrow lanceolate and usually much laciniated, or appearing as if torn. The shining appearance of the rachides. A stout caudex.

Rather thick, of an almost woody substance at the base, generally about half the length of the frond; brownish purple; the rachides are green and shining.

Narrow-lanceolate in shape. They are numerous near the base of the stipes where they are large; they are less plentifully scattered on the upper part of the stipes; there are also a few on the rachides, and on both of them there are many round stalkless glands. The scales are rust-coloured.

Bipinnate; broadly elongate-triangular, the lowest pair of pinnæ being always much larger than the rest; the pinnules on the lower side of the secondary rachis are always larger than those on the upper side. In most of the fronds the lowest pinnules are deeply pinnatifid, and some are pinnulets (divisions of pinnules), so that the frond then becomes tripinnate. The whole leafy portion has a crisped appearance, from the margin being curled inwards; this is not clearly seen in the dried fronds. The margin is cut into short spines, besides being more or less pinnatifid. The fronds, when dry, have a fragrance like new hay. Colour pale green. 12-18 long, 6-10 wide.

Rather thin; the under side is covered with stalkless glands, from which probably the hay-scented fragrance comes.

Not deciduous.

That of a pinnulet; consists of a clearly seen secondary mid-vein, which proceeds from the primary mid-vein in the pinnules, and produces veins and venules which extend nearly to the margin.

On the apex of the venules nearest the mid-vein of the pinnule or pinnulet.

Somewhat round; about six or more on a pinnulet, more on a pinnule, according to the size; they often become confluent, and are usually situated all over the frond.

Dorsal.

Kidney-shaped; its margin has a few stalkless glands, and is jagged and uneven; pale brown. It does not die away early.

It is more plentiful in Ireland than elsewhere. In England, Cornwall and Somerset are its only counties. In Wales and Scotland it is rare.

This plant is by some botanists called *Seniseiæ*, and by others *recurva*. The name of buckler-fern has been given to the several species of this genus in reference to the shield or buckler-like shape of their indusium.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex

Stipes and Rachis .

Scales of ditto . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal.

Indusium

Where found

General Remarks .

19. **ATHYRIUM FILIX-FEMINA**, Roth. Common Lady Fern.

The short sorus, with fringed indusium, situated on the upper or inner side of the venule, but almost always curved across it, so as to make its shape somewhat that of a horse-shoe. The indusium being forced back by the sorus. Only one species, British.

A caudex, stout, and sometimes elongated.

Stout, and thickened just above the base; of one-third to one-fourth the entire length of the frond; green, in the normal type, as are the rachides.

Numerous on the lower part; lanceolate or linear; varying in colour, usually a reddish brown with a dark centre. On the primary rachis there are a few, but these are smaller and narrower.

Variable in outline, &c. In the normal type, broadly lanceolate; bipinnate; pinnæ rather elongated; pinnules more or less lobed or pinnatifid, the lobes being bluntly toothed. Colour, bright soft green. 1-5 ft. high, 6 in. to 1 ft. or more wide.

Thin and soft; resembling lace, from its bipinnate character, combined with such a fragile and flexible substance.

Deciduous.

A wavy mid-vein goes from the secondary rachis into each of the pinnules; from it branch veins and venules; these latter terminate just within the apex of the teeth, with the number of which they correspond.

On the upper venules (those nearest the mid-vein), on their inner side and on about their centre. When the sori are curved, the receptacle also crosses the venule, and becomes somewhat horse-shoe-shaped.

Usually rather resembling that of a horse-shoe, but occasionally short and oblong. About twelve on a pinnule, but varying; sometimes confluent.

Dorsal.

Horse-shoe-shaped or short oblong; whitish, becoming very pale brown; it opens by rising at its inner side, remaining attached (though much turned back) till the frond withers. Its margin is much fringed with hair-like segments.

In moist places, chiefly on banks near water. Common; most so in Ireland.

This fern has developed into a very large number of varieties. By some botanists this is placed in the *Asplenium* genus, but others think its horse-shoe-shaped indusium sufficient to separate it. It also resembles the *Lastrea* genus when the indusium is horse-shoe-shaped, but in that genus this and the sori are on the surface of the venules, not on their side, as in *Athyrium*.

Generic Characters.

Distinctive Specific Characters.

Rhizome or Caudex

Stipes and Rachis .

Scales of ditto . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found

General Remarks .

20. **ASPLENIUM SEPTENTRIONALE**, Hoffm. Forked Spleenwort.

Linear sori singly placed on the side of the veins, and linear indusium; both straight, not curved. Indusium attached by its outer side, and opening at its inner side.

The narrowness of the leafy portion of the frond. Its pinnatifid state; the tapering of its divisions to a point which gives the frond a forked appearance.

A small caudex.

Rather long and stoutish, dark green, except near the base, where it is dark purplish-brown; rachis dark green, the same colour as the frond.

None.

So narrow is the leafy portion that it appears as if the rachis was merely branched into thickened linear-lanceolate lobes; but there is a leafy portion which, though but partially separated from the rachis as pinnæ, is really developed into pinnatifid divisions of what is, correctly speaking, a simple pinnatifid frond, lanceolate in shape. These pinnatifid divisions, which are usually three, sometimes two, in number, taper much to a point; and generally each is cut into three-pointed segments. Frond 3-4 long, $\frac{1}{4}$ to $\frac{1}{2}$ an inch wide; dark green in colour.

Rather stout and leathery. Smooth.

Not deciduous.

There is no mid-vein or principal vein in the pinnatifid divisions; but the rachis sends out into each of the three principal divisions veins which bear venules that extend to the margin.

On two or three of the venules, extending for nearly their whole length and on their inner side.

Linear-elongate. Three or four to each of the three pinnatifid divisions that take the place of pinnæ; they soon become confluent, and then usually cover the under surface.

Dorsal.

Linear-elongate, thin of pale colour, its margin entire, opening towards the centre. It is pushed back by the ripening sorus, and dies away finally, though not for some time.

Sparingly in Wales, the north of England, and in Perthshire, N.B. Not in Ireland. A very rare fern.

It grows luxuriantly in some parts of Switzerland, always on rocks, as in our country. The English name of *Spleenwort*, given to the species of this genus, is in allusion to their supposed medicinal qualities, *wort* being merely an old English name for an *herb*.

Generic Characters.**Distinctive Specific Characters.****Rhizome or Caudex****Stipes and Rachis.****Scales of ditto****Frond****Texture of Frond****Deciduous or not****Venation****Receptacle****Sori****Dorsal or Marginal.****Indusium****Where found****General Remarks**

21. **ASPLENIUM GERMANICUM**, *Weiss*. Alternate-leaved Spleenwort.

Linear sori singly placed on the side of the veins, and linear indusium; both straight not curved. Indusium attached by its outer side, and opening at its inner side.

The pinnae being alternate, and attached to the rachis at decided intervals. The wedge-shape of the pinnae, and their not tapering to a point, as do the pinnatifid divisions that take the place of pinnae in *A. septentrionale*.

A small caudex.

Slender; about half the length of the frond. Brownish purple for about half its length, the rest green as is the rachis.

None.

Narrow linear-lanceolate. Pinnate. The pinnae are small wedge-shaped, and slightly notched. Two or three of the lower pinnae have a side lobe. They are not placed opposite each other on the rachis, but alternately at intervals (hence its name). 2-3 long, $\frac{1}{4}$ of an inch wide. Rather pale green in colour.

Somewhat leathery. Smooth.

The fronds usually perish in the winter, though the fern is not regularly deciduous.

There is no mid-vein, but three or four veins proceed from the rachis, going into each pinna, and branch into venules which extend to the margin. There are also veins and venules in the side lobes of the pinnae.

On two or three of the venules in the centre of each pinna, extending nearly their whole length.

Linear elongate two or three to a pinna; they become confluent as the frond advances to maturity. Dorsal.

Linear-elongate; thin, pale in colour. Its margin is entire and somewhat wavy, but not jagged; it is pushed open and turned back by the ripening sorus, but remains attached for some time.

Between rocks: almost entirely confined to a few localities in Scotland, the North of England, and North Wales, but found very sparingly.

It is one of our rarest ferns, and is nowhere common. It somewhat resembles *A. septentrionale* and *A. Ruta-muraria* in general appearance. It is most like the latter, but the wedge-shaped pinnae, not divided into pinnules, as in *A. Ruta-muraria*, clearly distinguish it, as does its different outline.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex
Stipes and Rachis .

Scales of ditto . .
Frond

Texture of Frond .
Deciduous or not .
Venation

Receptacle
Sori
Dorsal or Marginal.
Indusium
Where found . . .

General Remarks .

22. **ASPLENIUM RUTA-MURARIA, L.** Rue-leaved Spleenwort or Wall Rue.

Generic Characters .	Linear sori singly placed on the side of the veins, and linear indusium; both straight, not curved. Indusium attached by its outer side, and opening at its inner side.
Distinctive Specific Characters.	Its triangular outline with the apex of the frond not elongate; its wedge-shaped pinnules, and the bluish-green colour of the frond.
Rhizome or Caudex	A small caudex.
Stipes and Rachis .	As long as, or longer, than half the length of the entire frond. Green, except near the base, where it is dark purple. Rachides green.
Scales of ditto . .	None.
Frond	Triangular in outline. Bipinnate; in luxuriant growth almost tripinnate. 1-6 long, about 1 wide. Pinnæ of a dark bluish-coloured green, alternate on the primary rachis; the pinnules are wedge-shaped, and toothed on the margin, or sometimes lobed. In small fronds its bipinnate character is not so decided.
Texture of Frond .	Leathery. Smooth.
Deciduous or not .	Not deciduous.
Venation	There is no mid-vein, but a series of veins branch from the primary rachis into each pinnule, and send out many venules which extend to the margin.
Receptacle	On the inner side of the venules, at about the middle portion of the pinnules.
Sori	Linear, about four or five to a pinnule, becoming, however, confluent.
Dorsal or Marginal.	Dorsal.
Indusium	Narrow, linear, its margin jagged or crenate; it is soon pushed away by the ripening sorus, and quickly disappears.
Where found . . .	Growing in the mortar of old stone walls. Commonly distributed throughout the United Kingdom; less plentiful in Scotland than elsewhere.
General Remarks .	There is not much fear of this fern being confounded with <i>A. germanicum</i> (its near ally) on account of the great rarity of the latter. It has been named <i>Rue</i> on account of its likeness to the garden plant of that name.

23. **ASPLENIUM VIRIDE**, *Huds.* Green Spleenwort.

Generic Characters	
Distinctive Specific Characters.	
Rhizome or Caudex	
Stipes and Rachis .	
Scales of ditto . .	
Frond	
Texture of Frond .	
Deciduous or not .	
Venation	
Receptacle	
Sori	
Dorsal or Marginal .	
Indusium	
Where found	
General Remarks .	

Linear sori singly placed on the side of the veins, and linear indusium ; both straight, not curved. Indusium attached by its outer side, and opening at its inner side.

The green rachis and partially green stipes. The position of the receptacle, which is not so near the apex of the vein or venule as in *A. Trichomanes*.

A caudex which is small.

Stipes usually about one-third of the length of the frond ; dark brown towards the base, green above, rachis also green.

None.

Linear. Pinnate. 3-8 long, $\frac{1}{2}$ inch wide. Pinnæ crenate ; bright green in colour.

Thin. Smooth.

Not deciduous.

A mid-vein goes from the rachis into each pinna ; veins branch from it, and usually venules which end in thickened points near the margin. The veins do not always branch into venules.

On the side of the vein or venule that is nearest the mid-vein, not near their apex. When venules are present the receptacle commences at where the veins branch, and continues below the place of the branching.

Linear. About six on a pinna ; they usually become confluent early.

Dorsal.

Linear. Jagged at its outer edge ; it is soon pushed back by the sorus, and then dies away.

Usually among moistened rocks. More common in Scotland than elsewhere, but never frequent.

This fern much resembles *A. Trichomanes*, differing chiefly in the green rachis, brighter green colour of the fronds, and in the fact of the pinnæ not falling from the rachis, but decaying with it in the usual way.

24. **ASPLENIUM TRICHOMANES, L.** Common Spleenwort.

Linear sori singly placed on the side of the veins and linear indusium; both straight, not curved.
Indusium attached by its outer side, and opening at its inner side.

Pinnate fronds, with the dark brown rachis and stipes.

A caudex, small.

Very dark brown; this colour is continued in the rachis. Both are glossy.

None.

Linear; pinnate; pinnæ slightly crenate. 6-12 long, $\frac{1}{2}$ to $\frac{1}{4}$ an in. broad. Not so bright a green as in some of the species.

Slightly leathery; smooth.

Not deciduous.

A mid-vein from which proceeds a vein; this vein sends out two venules, the upper one of which branches again into veinlets, the lower one bearing (in the case of the first pair of veins, that is those nearest the rachis) the sori. After the first pair of veins, the venation is simply a vein on each side of the mid-vein, which branches into two venules, the lower one bearing the sori.

On the side nearest the mid-vein of that venule which is closest to the mid-vein, beginning from where the vein branches into venules; it is continued nearly to the apex of the venule.

Linear; about eight on a pinna; sometimes becoming confluent.

Dorsal.

Of linear shape, extending nearly the whole length of the venule. It is of a pale colour and dies away early.

Usually on stone walls. Pretty generally distributed.

It grows to greater luxuriance on a hedge-bank than between stones. The pinnæ, when old, fall off the rachis, leaving it bare amid the new fronds.

Generic Characters .**Distinctive Specific Characters.****Rhizome or Caudex****Stipes and Rachis .****Scales of ditto . .****Frond****Texture of Frond .****Deciduous or not .****Venation****Receptacle****Sori****Dorsal or Marginal .****Indusium****Where found . . .****General Remarks .**

25. **ASPLENIUM MARINUM**, L. Sea Spleenwort.

Linear sori singly placed on the side of the veins and linear indusium; both straight, not curved; indusium attached by its outer side and opening at its inner side. Its broadly linear outline; decided leathery texture and deep green colour.

A small caudex.

Rather short, dark brown, as is also the lower part of the rachis, the rest of it is green and is slightly bordered with a leafy substance.

None.

Broadly linear, pinnate, pinnæ tapering to the apex, their margin much crenate, their upper side near to the rachis, is more or less shaped into an ear-shaped lobe. Frond 6-12 long, 2-3 wide, deep green in colour.

Leathery, smooth, and very glossy.

Not deciduous.

A very distinct wavy mid-vein goes from the rachis into each pinna, from it branch veins, and from most of these venules, all of which terminate in thickened points, a little way from the margin of the pinna. In the ear-shaped lobe, on its upper side, near the rachis, there is more extensive venation, that is, the vein that leaves the mid-vein bears venules and veinlets; the latter are again branched.

On the inner side of the venules that are nearest the mid-vein, at about their centre, not extending quite to their apex.

Linear 3-9 on each pinna; they form two lines on both sides of the mid-vein, becoming confluent in time, and sometimes then cover the whole under-side of the pinna.

Dorsal.

Linear, pale brown; it remains attached after the sorus is mature, but opens lengthways to let the ripening spore-cases protrude, and dies away when they become confluent; its margin is entire.

Almost invariably between crevices of sea-cliffs. In the south-west of England, also in Wales. Near Penzance, inside caves splashed by the sea, it attains to luxuriant growth.

It has been named *marinum* (Latin for *belonging to the sea*), in allusion to its favourite abode, which is where it can have the spray of the waves.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex

Stipes and Rachis .

Scales of ditto . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal.

Indusium

Where found . . .

General Remarks .

26. *ASPLENIUM FONTANUM*, Bernh. Smooth Rock Spleenwort.

Linear sori singly placed on the side of the veins, and linear indusium; both straight not curved; indusium attached by its outer side, and opening at its inner side (in this species all these characters are not quite consistent as the sori and indusium are usually more oblong than linear). The leafy border to the primary and secondary rachides; the narrow lanceolate outline of the fronds; the venation consisting of a mid-vein and veins only, rarely of venules; the spines projecting from the pinnules and pinnatifid divisions, being rather thicker and less pointed than in *A. lanceolatum* (the species it most resembles).

A small caudex.

Short, rather slender, green, except near the base, where it is dark purplish brown. The rachides are green, with a leafy border.

A few narrow-pointed and dark buff in colour, near the base of the stipes.

Narrow lanceolate; the widest part is above the middle of the frond; bipinnate. Pinnæ oblong-ovate, with pinnules roundish-obovate, tapering to the base; the lower ones only are distinctly stalked, the rest of the leafy portion being pinnatifid. All the pinnules and pinnatifid divisions have spines varying from 3-7 to a pinnule or pinnatifid lobe. Frond 3-6 long, $\frac{1}{4}$ inch to $1\frac{1}{2}$ wide.

Rather rigid and smooth.

Not deciduous.

A mid-vein goes from the secondary rachis into each pinnule or division, from it branch as many veins as the number of spines in the pinnule or pinnatifid division; these veins extend almost to the apex of each spine.

On two or three of the veins nearest the mid-vein in each pinnule or pinnatifid division, on their inner side, and near their base.

Oblong short, from 2-4 on each pinnule or pinnatifid division, but soon becoming confluent, when they usually cover the entire under side.

Dorsal.

Oblong, short, white in colour. Its margin entire, sometimes rather wavy. It does not always entirely die away early, portions occasionally remaining after the sori become confluent.

On rocks or old walls. Hardly anywhere but in the three following localities: near Belfast, Ireland; on Tooting Common, Surrey; and near Petersfield, Hants.

It is just possible that this very rare fern in the United Kingdom may be found in spots difficult to reach, and which at present have not been carefully searched by experienced botanists.

Generic Characters.

Distinctive Specific Characters.

Rhizome or Caudex Stipes and Rachis.

Scales of ditto . . . Frond

Texture of Frond . . . Deciduous or not . . . Venation

Receptacle

Sori

Dorsal or Marginal . . . Indusium

Where found

General Remarks

27. **ASPLENIUM LANCEOLATUM**, *Huds.* Lanceolate Spleenwort.

Linear sori singly placed on the side of the veins and linear indusium; both straight, not curved: indusium attached by its outer side, and opening at its inner side. In this species all these characters are not consistent, as the sori and indusium are usually oblong, or when old the former is generally roundish in form.

Being broadly lanceolate in outline; having scales on the primary rachis, and the back of it being brown in colour.

A caudex which is rather stout.

One third of the length of the frond, or sometimes longer; brown near the base, this colour being continued more or less (varying in different fronds), through the stipes, and along the back of the primary rachis, the rest of it is green. The older and larger the frond is, the darker, as a rule, is the stipes, &c.

A few, hair-like, medium brown in colour, scattered on the stipes and primary rachis at intervals; on the latter they are smaller.

Broadly lanceolate; bipinnate, excepting in young plants, when they are only pinnate with pinnatifid lobes, or sometimes the lower pinnae bear pinnules near the rachis, the rest of the leafy portion being pinnatifid. All the pinnules and pinnatifid divisions are toothed with spines, which are less thick than in *A. fontanum* and more pointed. Frond 6-9 long, 2-4 wide; the pinnae, pinnules, &c. are not elongated, but somewhat round at their apex. Colour rather dark green.

Slightly leathery, less so when growing in a damp place. Smooth.

Not deciduous.

A wavy mid-vein goes from the secondary rachis into each pinnule or pinnatifid division; from it branch veins and venules, the latter of which extend to the margin, and nearly all of them terminate near the apex of the spines; there are usually as many spines as there are venules. The apex of the venule ends in a thickened point in the spine.

On the inner side of two, three, or four venules in each pinnule and pinnatifid lobe at about the middle of the venules, extending nearly to the margin of the frond.

Oblong, but sometimes somewhat roundish when old: two, three, or four to a pinnule, but becoming confluent in time.

Dorsal.

Oblong, white, margin wavy; portions of it often remain on after the sori are confluent.

On stone walls usually. Not common, except in the Channel Isles. Barmouth in Wales used to produce it in quantities, but now it is scarce there.

This species resembles *A. fontanum* in many points, *A. Adiantum-nigrum* in others; it differs chiefly from the former in not having the leafy-bordered rachides.

Generic Characters.	
Distinctive Specific Characters.	
Rhizome or Caudex	
Stipes and Rachis .	
Scales of ditto . .	
Frond	
Texture of Frond .	
Deciduous or not .	
Venation	
Receptacle	
Sori	
Dorsal or Marginal .	
Indusium	
Where found . . .	
General Remarks .	

28. **ASPLENIUM ADIANTUM-NIGRUM, L.** Black Maidenhair Spleenwort.

Linear sori singly placed on the side of the veins and linear indusium; both straight, not curved; indusium attached by its outer side, and opening at its inner side.

Its triangular outline combined with its bipinnate or partially tripinnate character.

A caudex rather stout.

Usually as long, or sometimes longer than the leafy portion; dark purplish brown; the same colour is continued some way up the primary rachis at the back, only, the rest is green.

A few on the base of the stipes, lanceolate, and ending in hair-like points.

Triangular, more or less elongated at the apex; bipinnate, or sometimes partially or quite tripinnate; the pinnæ are elongated at the apex and all toothed with sharp serratures. Frond 7-14 long, 4-6 wide. Those pinnules nearest the primary rachis are much larger than the others; bright green in colour.

Rather leathery, but thinner than *A. lanceolatum*, smooth, and glossy.

Not deciduous.

Each pinnule has a distinct, visible mid-vein; veins, and sometimes venules, branch from it.

On the inner side of the veins beginning from near the mid-vein and extending beyond where the venules, when present, commence; but it is not continued to their apex.

Linear, about 2-6 on a pinnule, becoming confluent when old.

Dorsal.

Linear narrow, very pale in colour, and almost transparent when young, showing the sporangia underneath; the margin is entire; it does not die away early, but remains on after the sori become confluent.

Usually on hedge-banks, and is universally distributed.

There is a great resemblance between this species and *A. lanceolatum*, but besides the specific characters the larger fronds, the apex and pinnæ being elongated, and the fact of its being much more commonly distributed, clearly distinguish them.

Generic Characters.**Distinctive Specific Characters.****Rhizome or Caudex****Stipes and Rachis .****Scales of ditto . .****Frond****Texture of Frond .****Deciduous or not .****Venation****Receptacle****Sori****Dorsal or Marginal.****Indusium****Where found . . .****General Remarks .**

29. **SCOLOPENDRIUM VULGARE, Sm.** Common Hart's Tongue Fern.

The sori being arranged in two lines under one indusium; the indusium bursting between them; its being fixed to the lower venule of one vein, and the upper venule of the next vein. The fronds being simple, not pinnate or pinnatifid.

Only one species, British.

A caudex.

About a third of the frond in length, brown in colour, the mid-vein is the rachis.

Very numerous, narrow, and pale brown; a few on the mid-vein also. They are white and downy-looking when the young fronds are unrolling.

Simple; entire (that is, not divided at all). Broadly linear, the apex elongate; it resembles a tongue in shape, except at the base of the leafy portion, which is rounded in the shape of a heart (called cordate). Margin entire. 6-18 long, 1-3 wide.

Almost leathery; less inclined to this texture when growing in damp situations.

Not deciduous.

The rachis, or mid-vein as this is called in a simple frond, sends out veins on either side, very close together; these veins branch into venules, which again occasionally develop into veinlets, and in each case they extend nearly to the margin of the frond, and end in thickened points.

On the upper venule of one vein, and also on the lower venule of the next vein below, in the middle of the frond.

Linear, in two lines or rows, and are covered by one indusium; when this dies away, the sori become confluent. There are usually about twelve sori on each side of the mid-vein of the frond.

Dorsal.

Linear shape, of a pale colour, situated on the lower venule of a vein, and on the upper venule of the next vein; it bursts in the middle, and is rolled back on each line of sori, and finally disappears as the sori become mature.

Usually on hedge-banks. Very generally distributed over the United Kingdom.

This has developed into a great number of varieties; but the student should well master the species in its normal (that is, original) form, before comparing it with them.

Generic Characters .

Distinctive Specific Characters.

'Rhizome or Caudex .

Stipes and Rachis .

Scales of ditto . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found . . .

General Remarks .

30. CETERACH OFFICINARUM, Willd. Scaly Spleenwort.

The oblong or linear sori, without a regular indusium, and the presence of scales on the whole of the under side of the frond; also the anastomosing of the veinlets, the reticulations of the scales on the stipes being of a black colour.

Only one species, British.

A small caudex.

Short; very dark brown towards the base, and brown usually for its whole length at the back; the rest green, as is also the rachis.

Numerous; ovate-lanceolate in shape, of a dull yellowish tint, beautifully marked with close black reticulations (markings that look like the meshes of a net).

Linear-lanceolate. Usually only deeply pinnatifid, but sometimes the lower divisions are divided to the rachis, when the frond becomes partially pinnate. 2-6 long, 1 in. or less wide. The pinnæ or lobes are of an ovate form, and either entire or slightly crenate at the margin. Colour, deep green on the upper surface; the under side is densely clothed with scales of a dull yellowish tint, like those on the stipes, but their reticulations are of the same tint, not black, and they are ovate-acuminate in outline.

Leathery; smooth on the upper surface, densely scaly on the under.

Not deciduous.

To examine it, it is necessary to remove the scales by taking off the skin of the frond with a sharp knife. A wavy vein goes into each lobe or pinna; it branches into venules and veinlets; these latter become joined more or less near the margin where they terminate. This joining together is called *anastomosing*; the net-work holes *areoles*.

On the inner side of the venules, that is the side nearest the vein; but the first venule on the upper side, and nearest the rachis, or mid-vein, bears a sorus on its outside also.

Linear-oblong. They are at first hidden by the scales, but finally protrude themselves; about eight to each pinna or lobe. Usually all the fronds are fertile; they become confluent and mix with the scales.

Dorsal.

No true ordinary indusium, but a kind of ridge which is white and thin; it is placed on the receptacle just behind the sorus, which is of the same shape. It is supposed that the presence of the scales prevents its being of the usual form.

Pretty generally distributed, except in Scotland, where it is rare. Stone walls are its favourite localities.

This fern is thought by some botanists not to differ much from the *Asplenium* genus. but I agree with others in thinking it should be separated.

Generic Characters .	
Distinctive Specific Characters.	
Rhizome or Caudex	
Stipes and Rachis .	
Scales of ditto . .	
Frond	
Texture of Frond .	
Deciduous or not .	
Venation	
Receptacle	
Sori	
Dorsal or Marginal .	
Indusium	
Where found	
General Remarks .	

31. BLECHNUM BOREALE, Sw. Common Hard Fern.

The linear sori and indusium, which are arranged on special venules in a continuous line on both sides of the mid-vein; not close to the margin of the pinnatifid division.

Only one species, British.

A caudex.

Dark brown. This colour is continued nearly all through the rachis; the stipes is long in the fronds that bear sori, but short in the others.

A few at the base; small and pointed, brown in colour.

Narrow-lanceolate; the one that bears sori is contracted and deeply pinnatifid. 8-12 long, and 1-2 wide. The frond that is not fertile is pinnate, and its pinnæ are broader than are the pinnatifid divisions of the frond bearing sori; it is 6-10 long, and about 1-2 in. in width. Both fronds are dark green in colour.

Rigid and harsh; smooth.

Not deciduous; but the fronds that bear sori do not remain on the plant so long as those that are barren.

A thick mid-vein goes into each pinna or pinnatifid division, and sends out veins; in the frond that bears the sori they are not so distinctly visible as in the barren one. The veins send out venules sideways, and are continued as it were from the joint of one vein to the corresponding venule, forming a continuous line which runs the breadth of the pinnatifid division, in the same way as does the mid-vein. This venule is not present in the barren frond, but there are venules of the usual kind, as there are also in the one that is fertile.

Transverse, that is, across the pinnatifid division; it reaches nearly to the apex of it, and is formed on a series of side venules.

Linear; they extend on each side near the mid-vein, when mature becoming confluent, and then covering the under side of the pinnatifid division.

Almost marginal when fully developed.

Linear in shape, arising half way between the margin of the frond and the mid-vein, on both sides of it. Not falling away early, but forced up on its inner side by the ripening sorus, and gradually split by it, at intervals.

Usually growing on damp banks. Common all over the United Kingdom.

This fern is sometimes placed in the foreign genus *Lomaria*, because the frond that bears sori is contracted, as in that genus; but a more decided generic character is found in the position of the indusium, which agrees with that of the *Blechnum* genus, in arising at a distance from the margin, not close to it, as is the case with that of *Lomaria*.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex

Stipes and Rachis .

Scales of ditto . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found . . .

General Remarks .

32. PTERIS AQUILINA, L. Common Brakes or Bracken.

The indusium and sori being in an extended line at the margin of the frond, and the indusium being often made up of two layers (though the inner one is not quite the same in character).

Only one species, British.

A rhizome, rather thick.

Stout; from 6 in. to 1 ft. or more long; almost black at the base, the rest yellowish green. The rachides are also of the same green colour.

None; but the stipes is downy when quite young.

Variable in outline, the smaller fronds usually somewhat triangular; the larger ones are much more elongated. Bipinnate, or, in the case of large fronds, tripinnate; the margin either pinnatifid or unevenly lobed. Its size varies greatly according to the soil, from $\frac{1}{2}$ ft. to 8 or 10 ft. long, 1-2 ft. wide. Colour deep green.

Rather leathery; smooth on the upper surface, hairy on the under.

Deciduous.

That of a pinnulet is a rather stout mid-vein which produces veins, which are branched into venules which extend to the margin, where they meet a special thread-like venule that goes round the margin.

On the special venule which extends along the edge of the pinnulets.

Linear; continuous; situated all round the margin of the pinnulets or pinnules as the case may be. Marginal.

Linear; continuous; of the same form as the sori; it opens by lifting up from its inner side; it does not die away early. There is also a kind of second indusium, but it is formed on the inner side of the receptacle; both are whitish in colour, and torn or jagged into jointed hair-like segments.

In waste places, woods, &c. The commonest of our native ferns. Universally distributed.

This is a very easy fern to distinguish, both from its sori being placed in a line at the margin of the frond (not found in any other British fern), and also from its bold and spreading habit.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex .

Stipes and Rachis .

Scales of ditto . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found . . .

General Remarks .

33. *ADIANTUM CAPILLUS-VENERIS*, L. Maiden-hair Fern.

The margin of the frond being converted into an oblong indusium at the top of the pinnules, the sorus being on three or four of the veinlets under one indusium, and the stipes and rachides being black and hair-like.

Only one species British.

Rhizome, slender.

Slight, of a brownish-black colour, as are also the rachides; both of these and the stipes are shining.

A few near the base of the stipes, small and narrow, dark in colour.

Bipinnate, or usually partially tripinnate. Generally ovate or triangular in outline; the pinnæ and pinnules are alternate on their respective rachides. Pinnules wedge-shaped, their outer edge rounded and deeply lobed; in those which do not bear sori the lobes are crenate; the lowest pinnæ have pinnules, which are usually divided into pinnulets, hence its partially tripinnate character. All the pinnules and pinnulets have decided hair-like stalks of the same brownish black colour as the rachides, but even more slender—6-12 long, about 1½-3 in widest part.

Thin, quite smooth; the colour is bright green.

Not deciduous.

There is no mid-vein, but in the little stalks that proceed from the rachides into the pinnules and pinnulets develops a series of veins which are branched into venules and veinlets. When the pinnules or pinnulets bear sori, these branchings of the veins extend nearly across the indusium; in those fronds that are not fertile, the venules are continued to the apex or margin, and end in the serratures.

On most of, or all, the venules at the apices of the pinnules or pinnulets on the under surface of the indusium.

In the very early stages linear, on the inner surface of the indusium on each venule, but very soon becoming confluent, and then forming an oblong-shaped mass.

Marginal.

Oblong, very thin, at first whitish in colour, pale brown when old, formed as it were of a part of the apex of the lobe of the pinnules and pinnulets, which is turned back to form the cover for the sori. It does not die away early, and opens at its inner margin, which is entire.

In caverns or on rocks, usually near the sea—Cornwall, Devon, Ireland, and Wales, but rare. The name maiden-hair is taken from the slender stipes, and rachides; *Capillus-Veneris* means literally the hair of Venus.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex Stipes and Rachis .

Scales of ditto . . Frond

Texture of Frond . Deciduous or not . Venation

Receptacle

Sori

Dorsal or Marginal Indusium

Where found . . . General Remarks .

34. **CYSTOPTERIS FRAGILIS**, *Bernh.* Brittle Bladder Fern.

The indusium being not flat, but resembling a hood, and being in outline broad at the base, and lengthened out to a point, also its being attached underneath the sorus by its broad base only.

The dark brown stipes; the pinnatifid divisions which take the place of pinnules being ovate-lanceolate in shape, and their segments being ovate or oblong, the veinlets ending in the projecting point of the tooth, and the fronds appearing in succession, beginning in May.

A rhizome, that is spreading, hardly creeping, slender.

Slight and brittle, dark brown; about one-third to one-half the length of the frond; rachis green.

A few at the base, pale brown, narrow, and tapering much to a point.

Oblong, lanceolate; strictly speaking, partially pinnate, with pinnae deeply pinnatifid; once, or more often twice, pinnatifid. The lobes that take the place of pinnules are ovate-lanceolate, and their segments are ovate or oblong; they have a few pointed teeth; dull green in colour, frond 6-12 long, $\frac{1}{4}$ inch to 1 wide.

Thin and delicate-looking, smooth.

Deciduous.

A wavy vein goes from the mid-vein into each pinnatifid division that takes the place of a pinnule; from it proceeds a venule into each lobe, and from it branch veinlets, which terminate in the projecting points of the teeth of the margin.

On the surface of the veinlets, at about their centre.

Roundish, about four to each lobe; they sometimes become confluent.

Dorsal.

White, and very thin. It is not flat, but curved over the sori, resembling a hood; in outline it is broad at its base, and usually rather lengthened out to a point. It is attached underneath the sorus at its broad base, and opens by lifting up towards its lower end, the upper part curls back; its margin is usually jagged, particularly at the apex; it dies away early.

Usually between rocks in mountainous districts, and is pretty generally distributed.

The English name of *bladder* is the translation of the Greek generic name which was given to this genus on account of the indusium, which is bladder-like. This species is called *brittle*, probably on account of the stipes, which breaks very easily.

Generic Characters .	
Distinctive Specific Characters.	
Rhizome or Caudex	
Stipes and Rachis .	
Scales of ditto . .	
Frond	
Texture of Frond .	
Deciduous or not .	
Venation	
Receptacle	
Sori	
Dorsal or Marginal .	
Indusium	
Where found	
General Remarks .	

35. **CYSTOPTERIS ALPINA**, Desv. Alpine Bladder Fern.

The indusium being not flat, but resembling a hood, and being in outline broad at the base, and lengthened out to a point; also its being attached underneath the sorus by its broad base only.

The short stipes; the pinnatifid divisions that take the place of pinnules being bluntly or acutely ovate, and their segments linear or linear-oblong, and the teeth being blunted,

A slight and spreading rhizome.

About a quarter the length of the frond; slender, green, except quite at the base, where it is dark brown. Rachis green.

A few at the lower extremity only, brown, and pointed in shape.

Lanceolate, partially pinnate, as in *C. fragilis*; pinnæ usually bipinnatifid, the divisions that take the place of pinnules are bluntly or acutely ovate, and their segments, which sometimes have a few blunted teeth, are linear, or linear-oblong; frond 3-6 long, 1-2 wide. Colour bright green.

Thin and delicate-looking; smooth.

Deciduous.

An almost straight vein goes from the mid-vein into each pinnatifid division that takes the place of a pinnule: from this vein a venule branches off to each lobe, and these venules have veinlets in number, according to the size of the frond, one of which terminates between each pair of the marginal teeth.

On the surface of the veinlets at about their centre.

Roundish, small, crowded, but not often confluent.

Dorsal.

White, of the same form as in *C. fragilis*, but its margin is always jagged.

Very rare in the United Kingdom; the only spot where it has been found is on an old wall at Leyton, in Essex.

It grows in some localities in the Alps, hence its name *alpina*. It much resembles *C. fragilis*; but besides its distinctive specific characters, the terminating of the veinlets between the segments, instead of in the projecting points of the teeth, and the vein being nearly straight, not waved, readily distinguish it.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex

Stipes and Rachis .

Scales of ditto . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found . . .

General Remarks .

36. CYSTOPTERIS MONTANA, Bernh. Mountain Bladder Fern.

The indusium being not flat, but resembling a hood, and being in outline broad at the base, and lengthened out to a point; also its being attached underneath the sorus by its broad base only.

The very creeping rhizome, the outline of the frond being triangular, and its margin more deeply tripinnatifid than in the other two species.

A slender rhizome.

Slight, usually longer than the leafy portion of the frond, dark brown at the base, green above, sometimes streaked with purple. Rachis green.

A few placed singly, pale brown and ovate-lanceolate in outline.

Triangular, 4-12 long, 3-4 wide. Partially pinnate with bipinnatifid or tripinnatifid pinnæ: the lobes that take the place of pinnules are ovate, and their segments also ovate and cut into coarse linear teeth; in colour it is rather dark green.

Thin and fragile-looking, smooth.

Deciduous.

A nearly straight vein goes from the mid-vein into each pinnatifid division that takes the place of a pinnule, and sends out venules into each lobe, and a veinlet towards each tooth; this latter ends between the marginal teeth.

On the surface of the veinlets, at about their centre.

Somewhat round, and larger than in the other two species. On the whole of the under side of the frond. Crowded, but not often becoming confluent.

Dorsal.

White and very thin, more inclined to be round than in the other two species.

Usually on moist rocks among moss in mountainous districts. Only in Scotland, and rare there.

If this species is not examined before the indusium has died away, there is danger (to the beginner especially) of confusing it with *Polypodium Dryopteris*.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex

Stipes and Rachis .

Scales of ditto . .

Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found . . .

General Remarks .

37. **WOODSIA ILVENSIS**, *R. Br.* Oblong Woodsia.

The indusium (called the involucre in this genus) being placed not as an entire cover to the sori, except in their very earliest stage, and not always then, but attached underneath them, and the splitting of almost the whole of it into hair-like segments. The presence of scales and hairs on the fronds. The stipes being articulated, that is, it has a joint near its base, at which, if the fronds remain till quite old, they separate from, leaving the lower part of the stipes on the caudex.

Its more erect growth, and more firm and rigid texture than is the case in the Alpine Woodsia. There are a greater number of scales on the frond, and it is more hairy. The shape of the frond is broader and the colour darker; the pinnæ are more elongated, with much narrower segments, which are more oblong and more deeply cut or pinnatifid.

A small caudex.

Slender, 1-2 inches long; colour, reddish-brown, which sometimes continued part of the way along the rachis, which is otherwise green.

Numerous; also on the rachis; pale buff in colour.

Lanceolate-oblong, pinnate. 2-6 long, about 1 inch wide; pinnæ usually opposite each other and pinnatifid into deep lobes, which are crenate.

Rather thick; both surfaces, and usually the margins, have coarse, whitish, glittering and jointed hairs, and on the under surface, especially on the veins, there are pointed scales of a pale rust colour, so that together with the hair-like segments of the involucre, the back is much clothed. Deciduous.

A wavy, but not very distinct, secondary mid-vein goes from the primary mid-vein into each lobe of the pinna, from which branch veins, the lowest of which usually branch into venules that extend almost to the margin and terminate in thickened points.

On the venules, or veins, near their apex, and on their surface.

Round, 4-6 on a lobe, they sometimes become confluent.

Dorsal.

Called an involucre because it is seated underneath the sorus, it does not quite cover it and opens very early, splitting into hair-like segments which surround the young spore-cases and mix with the hairs.

In the crevices of rocks in the mountains of Scotland, Wales, and North of England; but a very scarce fern and not found in Ireland at all.

The rarity of the Woodsias prevents their being commonly known.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex
Stipes and Rachis .

Scales of ditto . .
Frond

Texture of Frond .

Deciduous or not .
Venation

Receptacle
Sori
Dorsal or Marginal .
Indusium

Where found . . .

General Remarks .

38. **WOODSIA HYPERBOREA**, R. Br. Alpine Woodsia.

The indusium (called the involucre in this genus) not being placed as an entire cover to the sori except in their very earliest stage, and not always then, but attached underneath them, and the splitting of almost the whole of it into hair-like segments. The presence of scales and hairs on the fronds. The stipes being articulated (that is, it has a joint near its base, at which, if the fronds remain till quite old, they separate from, leaving the lower part of the stipes remaining on the caudex).

The more tender texture of the frond, which is also much less hairy and scaly. Its linear outline, with pinnae, usually alternate on the rachis, instead of rarely so, as in *W. ilvensis*; the roundish obovate shape of their lobes, which are much less deeply pinnatifid.

A small caudex.

Slender, rather shorter than in *W. ilvensis*, pale reddish brown, rachis usually partially the same colour, otherwise green.

A few pale-coloured, pointed in shape, also on the rachis.

Linear, pinnate. Pinnae almost always alternate on the rachis, and pinnatifid, their lobes roundish-obovate in shape, and usually crenate. $1\frac{1}{4}$ –5 inches long, about $\frac{1}{4}$ inch wide.

Tender, almost smooth on the upper surface, on the under there are a few hairs and scales as in *W. ilvensis*, but they are not so numerous as in that species.

Deciduous.

That of a lobe is, a secondary, wavy mid-vein, which is not very visible, leaves the mid-vein and branches into veins and venules, the latter of which terminate within the margin in slightly thickened points.

On the surface of the venules, close to their apex.

Round, larger than in *W. ilvensis*, about four to a lobe, they usually become confluent.

Dorsal.

Called an involucre, see *W. ilvensis*. Whitish, and splitting into hair-like segments.

In the crevices of moist rocks, but only in two counties in Scotland, and on Snowdon, Wales.

This species has been also sometimes called *W. alpina*; it is still more rare than *W. ilvensis*, and not common even in Alpine districts.

Generic Characters.**Distinctive Specific Characters.****Rhizome or Caudex Stipes and Rachis.****Scales of ditto****Frond****Texture of Frond****Deciduous or not****Venation****Receptacle****Sori****Dorsal or Marginal.****Indusium****Where found****General Remarks**

39. TRICHOMANES RÂDICANS, Sw. European Bristle Fern.

Very pinnatifid, large, transparent fronds, with the thin, leafy substance that borders the stipes, rachis and all veins. The hair-like bristle of the receptacle. The involucre being in one part and not two-valved.

Only one species British.

Rhizome, rather slender, clothed with a thick coating of dark, bristly hairs.

Rather long and stout; dark green; it is bordered by a thin, leafy substance almost from its base, this is also continued through the rachis.

Instead of scales, there are a few bristly, dark hairs at the base of the stipes.

Triangular-ovate, occasionally lanceolate, elongated towards the apex. Tripinnatifid, or sometimes quadripinnatifid. Very dark green, darker still when dried. 6-14 long, 3-6 in widest part. Fertile fronds narrower than the barren ones; both have a crisped appearance.

Very thin and transparent, quite smooth,—that is, not hairy.

Not deciduous.

The rachis sends out a mid-vein into each pinnatifid division (which takes the place of the pinnæ), from it branch the distinct, visible veins, venules, veinlets, and subdivisions of the latter into the very numerous lobes of the pinnatifid divisions; the mid-vein and each branch of it is bordered by a thin, leafy substance, the same as is the stipes and rachis. In the barren fronds the branches of the veinlets nearly extend to the margin, in the fertile fronds they extend beyond it when forming the receptacle, ending like long bristles, brown in colour.

The lowest outward branch of the vein in the final lobes is continued beyond the margin and forms the receptacle, the spore-cases are arranged all round it without stalks, appearing as if clinging to the column, which shape it resembles; the receptacle stands out beyond the involucre, resembling a brown bristle and projects more as the spore-cases ripen and come out with it; they occasionally cover the top of the receptacle, but fall from it when mature.

Column-shaped inside the involucre; there are from 6-8 of these involucre with spore-cases, on each pinnatifid division, which takes the place of a pinnule.

Extra-marginal,—that is, much beyond the margin.

None: but instead of it an involucre of the same texture and colour as the frond. Nearly pitcher-shaped, situated on the margin of the frond, extending beyond it, surrounding the sorus and receptacle. The lips of the opening entire, smooth.

In Ireland; formerly in Yorkshire and Wales. Clinging to dripping, shaded rocks.

The fronds should be examined before being dried, or they have a bipinnate appearance from the shrinking of the leafy border to the rachis. This is often called the Killarney fern.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex

Stipes and Rachis .

Scales of ditto . .

Frond . . . 2

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Dorsal or Marginal .

Indusium

Where found . .

General Remarks

40. HYMENOPHYLLUM TUNBRIDGENSE, Sm. Tunbridge Film Fern.

This genus differs from *Trichomanes* in the involucre being nearly round, and by being composed of two valves or parts, by its splitting right down instead of opening only at the mouth, and by the receptacle not extending beyond the involucre to form a bristle.

The involucre being round and almost flat, and its lips or margins being fringed, also the fronds are more pinnatifid and their lobes are not entirely confined to the upper side.

Rhizome black and wire-like.

Slender, wiry, dark-coloured, bordered near the rachis by a leafy substance.

None.

Usually ovate, or lanceolate-ovate, rather elongated. Bipinnatifid, the leafy portion that borders the rachis, preventing it from being pinnate, though in some cases the lowest pair of divisions are pinnate. Very dark green in colour. 1-3 long, $\frac{1}{4}$ -1 broad. The lobes of the pinnatifid divisions are serrated, and are chiefly on the upper side.

Almost transparent, very thin, from which fact called Film fern; it is composed of cells that are easily seen with a lens, and is a beautiful framework to examine.

Not deciduous.

The rachis sends out a mid-vein into the pinnatifid divisions that take the place of pinnæ; this mid-vein sends out to the upper side of the division a vein on which forms the receptacle usually, but sometimes the lowest part of the pinnatifid divisions bears two receptacles, and if so, the venules, or veinlets, bear them. After sending off a vein to form the receptacle, the mid-vein continues its course, ending in the lowest pinnatifid lobe; before so doing it sends veins, venules, and veinlets into each pinnatifid lobe; but the lobes are almost all confined to the upper side, the lower not being often lobed. The veins, &c., are all dark-coloured and slightly bordered by the leafy substance.

On the vein which proceeds from the mid-vein; it is short, not reaching beyond the middle of the involucre; column-shaped; the spore-cases cling to it without stalks and terminate round its apex.

Column-shaped, inside the involucre; the spore-cases are not stalked. About six involucres to a frond.

Extra-marginal, that is, much beyond the margin.

None; but an involucre, as in the *Trichomanes* genus, though it is more round in shape than in that genus; and when the sorus is ripe inside it, it splits right down, its sides become very wide apart and the margins of the lips (not the sides), are always notched or fringed, even before it splits asunder.

On moist, shaded rocks. More common in Ireland and Scotland than in England.

To the beginner, this and its fellow species look somewhat like a moss called *Mnium undulatum*, but if their dark-coloured venation, pinnatifid fronds, and mode of fructification are well studied, there will be no danger of such a mistake.

Generic Characters	
Distinctive Specific Characters	
Rhizome or Caudex	
Stipes and Rachis	
Scales of ditto	
Frond	
Texture of Frond	
Deciduous or not	
Venation	
Receptacle	
Sori	
Dorsal or Marginal	
Indusium	
Where found	
General Remarks	

41. HYMENOPHYLLUM UNILATERALE, Bory. Wilson's Film Fern.

This genus differs from *Trichomanes* in the involucre being nearly round, and by being composed of two valves or parts; by its splitting right down, instead of opening only at the mouth; and by the receptacle not extending beyond the involucre to form a bristle.

The ovate shape of the involucre, which rises instead of being almost flat; its lips or margins being entire, not fringed; the fronds being not so much pinnatifid as in the other species; the lobes being quite confined to the upper side of the division, and the cells of the frond-structure being larger.

Rhizome black; very creeping and wire-like.

Slender, wiry, dark-coloured; not usually bordered, but the leafy border generally begins soon after the rachis commences.

None.

Linear-lanceolate. Bipinnatifid, except with regard to the lowest pair of divisions, which are usually pinnæ, not having the leafy border which the rachis has higher up. All the pinnæ are deeply pinnatifid and slightly serrated; the lobing is confined to the upper side. 3-4 long, $\frac{3}{4}$ -1 in widest part.

Almost transparent; thin, but not so much so as in its fellow species; the cells of the frond-structure are larger, and are easily seen with a lens. Not deciduous.

Much the same as in *H. tunbridgensis*. The veins have been spoken of under that species by their separate names, 'venules,' &c., but some authorities on ferns, when speaking of these two species, regard their venation as a series of veins, on account of their apparent uniform thickness. As in *H. tunbridgensis*, on the vein which proceeds from the mid-vein; the vein, before reaching the involucre which it supports, has more the character of a stalk than in that species. Column-shaped.

Column-shaped, inside the involucre; the spore-cases are not stalked. About eight involucre to a frond.

Extra-marginal.

None but an involucre, which is ovate in shape, its margins or lips entire, not fringed; it does not split open so widely as in *H. tunbridgensis*.

On moist rocks in North and South Wales; in several parts of England and Ireland.

More common than its fellow species, and not quite so fragile and dependent on moisture. In Scotland, about Loch Long particularly, the two grow together very luxuriantly, forming large mats on dripping rocks. *H. unilaterale* is sometimes called *H. Wilsoni*.

Generic Characters .

Distinctive Specific Characters.

Rhizome or Caudex
Stipes and Rachis .

Scales of ditto . .
Frond

Texture of Frond .

Deciduous or not .

Venation

Receptacle

Sori

Q

Dorsal or Marginal .

Indusium

Where found

General Remarks .

SUB-ORDER : **Osmundaceæ.****42. OSMUNDA REGALIS, L.** Royal Fern.

The firm and rather leathery texture of the spore-case, its opening vertically into two valves half-way down, and its having on one side towards the apex a small incomplete ring. The sori being borne on portions of the fronds in a very distinctive manner. (See under *Fronde*.)

Only one species British.

A caudex, very large and trunk-like.

About as long as the leafy portion of the frond, pale green, but becoming somewhat brown, as does the primary rachis; both are tinged with red; in a very young state the whole frond is of a dull red colour; the rachides and stipes are stout.

None.

Broadly lanceolate, bipinnate, 2-8 ft. long, 1 ft. or more broad; the pinnules are one or two inches long, usually ear-shaped or lobed at the base, and are rather elongated towards the apex; the margin is slightly crenate or serrated. Colour bright green. The fronds that bear sori have their leafy portion of the same form as the barren ones, except at their upper portion, where the sori are arranged round the veins of the secondary rachis; in large fronds the sori are also often found on the lower pinnae, when they take the place of the leafy substance which usually terminates the pinnule.

Rather stout, smooth.

Deciduous.

A stout mid-vein goes into the pinnule, and from it branch veins, each of which has two pairs of venules, the last pair extending to the margin.

Placed on the vein, which here has no leafy covering: it is only long enough to form the receptacle.

Nearly round, but becoming confluent, and forming clusters or elongated spikes separate from the leafy portion.

Surrounding the rachides and veins; no leafy portion exists with it.

None.

In wet or boggy places. Pretty generally distributed in Ireland, where perhaps it is most abundant; widely scattered over England and some parts of Scotland.

This is often called the *Flowering fern*, from the way the sori are placed, which gives the appearance of a brown flower. The name of *Royal fern* was given, no doubt, from the stately manner of its growth.

Generic Characters .**Distinctive Specific Characters.****Rhizome or Caudex****Stipes and Rachis .****Scales of ditto . .****Frond****Texture of Frond .****Deciduous or not .****Venation****Receptacle****Sori****Position of the Sorus****Indusium****Where found . . .****General Remarks .**

ORDER : **Ophioglossaceæ.**

(The Adder's Tongue Group.)

1. BOTRYCHUM LUNARIA, Sw. Common Moonwort.

The spike being branched, and the spore-cases being in two rows on the inner side of its branches, not surrounding them ; the leaves being divided into segments like pinnæ, and the veins not reticulated (netted).

Only one British species.

Small and bulb-like.

Green and branched, several times, beginning at about the middle of the stipes.

Lanceolate-deltoid in shape, with segments like pinnæ, that have somewhat the form of a half moon, with their margin usually crenate. 1-3 inches long, $\frac{1}{4}$ an inch in width. Sea-green in colour.

Thick and smooth.

Deciduous.

A vein enters each segment of the leaf and branches repeatedly into venules, so that the whole space is traversed with them ; they do not extend quite to the margin.

On the face or inner side of the branchings of the spike.

Almost round. It bursts transversely into two valves, at first green, but becomes golden brown. The spore-cases are arranged in two rows on the face of the branches of the spike, the whole of them forming what is called a *panicle*, resembling in shape a bunch of grapes.

Growing among grass. Fairly commonly distributed ; less so in Ireland.

The name of *Moonwort* was given in reference to the half moon or crescent-shape of the segments of the leafy portion ; *wort* is an old English name for an herb. *Lunaria* is merely the Latin for *moon-like*.

Generic Characters .

Distinctive Specific Characters.

The Stem

Spike

Leaf

Texture of ditto . .

Deciduous or not .

Venation

Receptacle

Spore-case

Where found . . .

General Remarks .

2. OPHIOGLOSSUM VULGATUM, L. Common Adder's tongue.

The spike being simple, not branched, the leaves being entire, not divided. The spore-cases arranged in a line in each margin of the spike, and as close to it as to appear as if the spike passed through them. Veins anastomosing.

The leaf being broadly ovate, or ovate-elongate, and altogether much larger than its fellow-species; consequently there are more spore-cases on the spike. Growth commencing in May, and decay beginning usually early in August.

Small and flat.

It is unbranched, and tapers very slightly upwards; yellowish green in colour.

Broadly ovate or ovate-elongate; it is undivided, and in colour yellowish green. 2-4 inches long, $\frac{1}{4}$ of an inch to 2 inches wide.

Stout and smooth.

Deciduous.

It consists of a series of uniform veins without a mid-vein, which everywhere unite (anastomose) and form a series of areoles; within these there are venules dividing the areoles into smaller ones, which extend to the margin of the leaf.

In each margin of the spike.

Almost round. It bursts transversely into two valves to discharge its spores; it is at first yellowish green, but becomes brown. The spore-cases are crowded and opposite each other, in number about twelve pairs.

Always in meadow land, common in England, less so elsewhere.

The peculiarities of the species of this genus make them easy to distinguish from all other plants.

Generic Characters.

Distinctive Specific Characters.

The Stem

Spike

Leaf. . . .

Texture of ditto . .

Deciduous or not .

Venation

Receptacle

Spore-case

Where found . . .

General Remarks .

3. OPHIOGLOSSUM LUSITANICUM, L. Dwarf Adder's-tongue.

The spike being simple, not branched, the leaves being entire, not divided. The spore-cases arranged in a line in each margin of the spike, and so close to it as to appear as if the spike passed through them. Veins anastomosing.

The leaf being lanceolate in outline and altogether much smaller than in its fellow-species, as is also the spike. There being usually two leaves to a plant instead of one, as is the case with *O. vulgatum*. Its colour being brighter and not yellowish-green, and the fact of its growing up in the winter, being mature by the end of January and disappearing before the summer.

Small and flat.

It is un-branched, much taller than the leaf, green in colour.

Lanceolate, and entire, bright green, 1·3 high, hardly $\frac{1}{4}$ of an inch wide.

Thick and fleshy, smooth.

Deciduous.

It is not very distinct, but consists of a series of uniform veins without a mid-vein; they branch into venules, which here and there unite (or anastomose), the areoles being long and narrow and extending to the edge of the leaf.

In each margin of the spike.

Almost round; from 3·6 in each margin of the spike; bright green, but they become brown.

In meadow land. The Island of Guernsey was supposed, till quite recently, to be the only locality for this species, but lately specimens have been received from Horn Head, Donegal, which probably are identical with the Guernsey plant.

The time of year for its growth is different in the plants recorded from Ireland, namely, the end of September they were mature, but this may be the result of the different climate.

Generic Characters.

Distinctive Specific Characters.

The Stem
Spike
Leaf
Texture of ditto
Deciduous or not . . .
Venation

Receptacle
Spore-case
Where found

General Remarks.

KEY TO THE GENERA OF FERNS.

SUB-ORDER *Polypodiaceæ*

Contains those genera that have the complete and usually vertical annulus and the spore-case splitting transversely, except in the case of *Trichomanes* and *Hymenophyllum*.

1. **Polypodium**.—Sori round ; no indusium.
2. **Allosorus**.—Fronds of two distinct kinds ; sori nearly round, concealed by the margin of the frond.
3. **Gymnogramma**.—Sori linear, forked ; no indusium.
4. **Polystichum**.—Sori round, with round indusium ; the indusium attached in its centre to the receptacle by a diminutive stalk.
5. **Lastrea**. — Indusium kidney-shaped, attached to the receptacle by a notch at its base.
6. **Athyrium**.—Short horseshoe-shaped sorus, with fringed indusium, which becomes much turned back:
7. **Asplenium**.—Sori linear, singly placed on the side of the veins ; indusium linear, both straight, not curved.
8. **Scolopendrium**.—Sori linear, arranged in two lines under one indusium ; fronds simple.

9. **Ceterach**.—Sori oblong or linear, without a regular indusium; scales on the whole of the under side of the frond.

10. **Blechnum**.—Sori and indusium linear, arranged on special venules in a continuous line on both sides of the mid-vein.

11. **Pteris**.—Sori and indusium linear, in an extended line at the margin of the frond.

12. **Adiantum**.—Margin of the frond converted into an oblong indusium at the top of the pinnules; sorus linear, on three or four of the veinlets, under one indusium; stipes and rachis black and hair-like.

13. **Cystopteris**.—Indusium resembling a hood, and attached beneath the nearly round sorus by its broad base only.

14. **Woodsia**.—Indusium (called the involucre) placed under and partly above the round sorus; involucre splits into hair-like segments.

15. **Trichomanes**.—Receptacle projecting beyond the involucre, and has the appearance of a brown bristle; involucre not divided into valves; fronds very transparent and much pinnatifid.

16. **Hymenophyllum**.—Involucre formed of two valves; receptacle not extending beyond it.

SUB-ORDER *Osmundaceæ*.

The chief characters of this sub-order are that the spore-case opens vertically and the annulus is incomplete.

17. **Osmunda**.—Fructification arranged in round clusters distinct from the leafy portion.

ORDER *Ophioglossaceæ* (Adder's-tongue Group).

1. **Botrychium**.—Spike branched ; spore-cases in two rows on the inner side of its branches, not surrounding them ; leaves divided into segments, veins not anastomosing.

2. **Ophioglossum**.—Spike simple (not branched) ; leaves entire ; spore-cases arranged in a line in each margin of the spike, and as close to it as to appear as if the spike passed through them ; veins anastomosing.

LIST OF FERNS.

ORDER *Filices*.SUB-ORDER *Polypodiaceæ*.

Polypodium vulgare, <i>L.</i>	Asplenium germanicum, <i>Weiss.</i>
Polypodium Phegopteris, <i>L.</i>	Asplenium Ruta-muraria, <i>L.</i>
Polypodium Dryopteris, <i>L.</i>	Asplenium viride, <i>Huds.</i>
Polypodium Robertianum, <i>Hoffm.</i>	Asplenium Trichomanes, <i>L.</i>
Polypodium alpestre, <i>Hoppe.</i>	Asplenium marinum, <i>L.</i>
Allosorus crispus, <i>Bernh.</i>	Asplenium fontanum, <i>Bernh.</i>
Gymnogramma leptophylla, <i>Desv.</i>	Asplenium lanceolatum, <i>Huds.</i>
Polystichum Lonchitis, <i>Roth.</i>	Asplenium Adiantum-nigrum, <i>L.</i>
Polystichum aculeatum, <i>Roth.</i>	Scolopendrium vulgare, <i>Sm.</i>
Polystichum angulare, <i>Presl.</i>	Ceterach officinarum, <i>Willd.</i>
Lastrea Thelypteris, <i>Bory.</i>	Blechnum boreale, <i>Sw.</i>
Lastrea Oreopteris, <i>Bory.</i>	Pteris aquilina, <i>L.</i>
Lastrea Filix-mas. <i>Presl.</i>	Adiantum Capillus-Veneris, <i>L.</i>
Lastrea remota, <i>Moore.</i>	Cystopteris fragilis, <i>Bernh.</i>
Lastrea rigida, <i>Presl.</i>	Cystopteris alpina, <i>Desv.</i>
Lastrea cristata, <i>Presl.</i>	Cystopteris montana, <i>Bernh.</i>
Lastrea dilatata, <i>Presl.</i>	Woodsia ilvensis, <i>R. Br.</i>
Lastrea æmula, <i>Brack.</i>	Woodsia hyperborea, <i>R. Br.</i>
Athyrium Filix-fœmina, <i>Roth.</i>	Trichomanes radicans, <i>Sw.</i>
Asplenium septentrionale, <i>Hoffm.</i>	Hymenophyllum tunbridgense, <i>Sm.</i>
	Hymenophyllum unilaterale, <i>Bory.</i>

SUB-ORDER *Osmundaceæ*.*Osmunda regalis, L.*ORDER *Ophioglossaceæ*.

- Botrychium Lunaria, Sw.*
Ophioglossum vulgatum, L.
Ophioglossum lusitanicum, L.

CONTRACTIONS OF THE NAMES.

IT is usual not to write out the name of the botanist in full when putting it after the specific name of the plant, but to abridge it, as the following explains :—

L. or *Linn.* = Linnæus, Carl (born in 1707, died in 1778), the great Swedish botanist.

Huds. = Hudson, William (1730–1793), an English writer on British plants.

Weiss = Weiss, F. W., a German botanist, born in 1744; the date of his death is uncertain.

Roth = Roth, Albrecht W. (1757–1834), a German botanist.

Sm. = Smith, Sir James Edward (1759–1829), a British botanist. First President of the Linnean Society.

Sw. or *Swtz.* = Swartz, Olaf (1760–1818), a Professor of Botany in Stockholm.

Hoppe = Hoppe, D. H. (1760–1846), a German botanist.

Hoffm. = Hoffmann, G. F. (1761–1826), a Professor of Botany in Göttingen.

Willd. = Willdenow, Karl Ludwig (1765–1812), a Professor of Botany in Berlin.

R. Br. = Brown, Robert (1773–1858), a distinguished British Botanist, formerly President

Linn. Soc. and Keeper Botanical Depart. British Museum.

Bernh. = Bernhardi, Johann J. (1774-1850), A Professor of Botany at Erfurt.

Bory = Bory, de Saint-Vincent, J. B. M. (1780-1846), a French botanist.

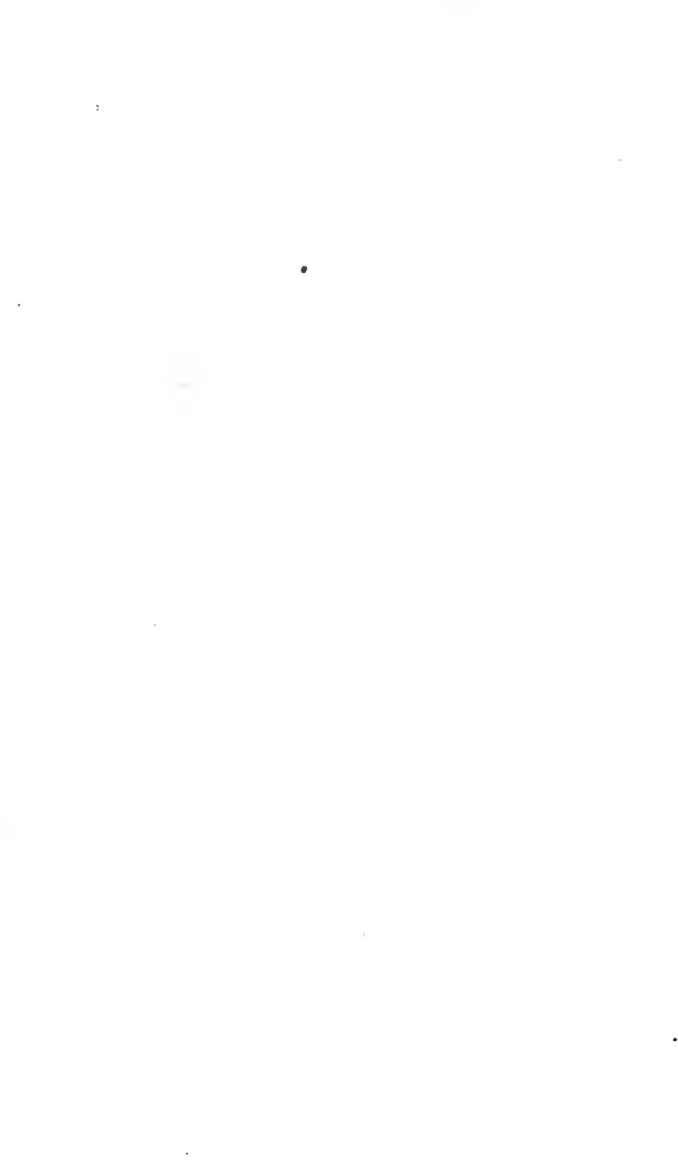
Desv. = Desvaux, Augustin. N. (1784-1856), a French botanist.

Presl = Presl, K. B. (1794-1852), Professor of Botany in Prague.

Gray = Gray, J. E. (1800-1875), author of *A Natural Arrangement of British Plants*, but best known from his labours in Zoology; late Keeper of the Zool. Depart. Brit. Mus.

Brack. = Brackenridge, W. D., a botanist appointed to the United States exploring expedition; still living.

Moore = Moore, T., the present Curator of the Chelsea Botanic Garden; author on British Ferns, &c.



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FOR THE HERBARIUM.

ORDER : **FILICES.**

SUB-ORDER : **POLYPODIACEÆ.**

Polypodium vulgare, *L.*

Polypodium Phegopteris, *L.*

Polypodium Dryopteris, *L.*

Polypodium Robertianum, *Hoffm.*

Polypodium alpestre, *Hoppe.*

Allosorus crispus, *R. Br.*

Gymnogramma leptophylla, *Desv.*

Polystichum Lonchitis, *Roth.*

Polystichum aculeatum, *Roth.*

Polystichum angulare, *Presl.*

Lastrea Thelypteris, *Bory.*

Lastrea Oreopteris, *Bory.*



Lastrea Filix-mas, *Presl.*

Lastrea remota, *Moore.*

Lastrea rigida, *Presl.*

Lastrea cristata, *Presl.*

Lastrea dilatata, *Presl.*

Lastrea æmula, *Brack.*

Athyrium Filix-fœmina, *Roth.*

Asplenium septentrionale, *Hoffm.*

Asplenium germanicum, *Weiss.*

Asplenium Ruta-muraria, *L.*

Asplenium viride, *Huds.*

Asplenium Trichomanes, *L.*

Asplenium marinum, *L.*

Asplenium fontanum, *Bernh.*

Asplenium lanceolatum, *Huds.*

Asplenium Adiantum-nigrum, *L.*

Scolopendrium vulgare, *Sm.*

Ceterach officinarum, *Willd.*

Blechnum boreale, *Sw.*

Pteris aquilina, *L.*

Adiantum Capillus-Veneris, *L.*

Cystopteris fragilis, *Bernh.*

Cystopteris alpina, *Desv.*

Cystopteris montana, *Bernh.*

Woodsia ilvensis, *R. Br.*

Woodsia hyperborea, *R. Br.*

Trichomanes radicans, *Sw.*

Hymenophyllum tunbridgense, *Sm.*

Hymenophyllum unilaterale, *Bory.*

SUB-ORDER : **OSMUNDACEÆ.**

Osmunda regalis, *L.*

ORDER : **OPHIOGLOSSACEÆ.**

Botrychium lunaria, *Sw.*

Ophioglossum vulgatum, *L.*

Ophioglossum lusitanicum, *L.*







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